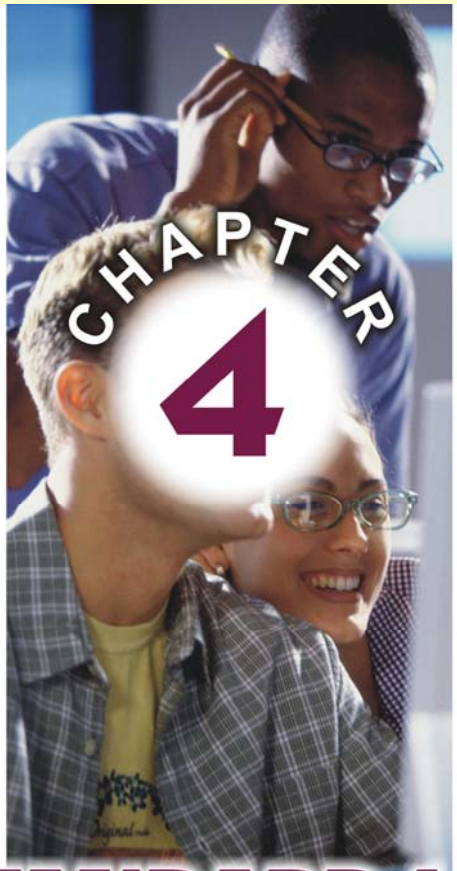

STANDARD I/O SYSTEMS

OBJECTIVES

1. Define the functions associated with the PC's input/output units.
2. Describe four common methods of initiating a data transfer in a PC.
3. Identify the various port connectors used in PC-compatible systems.
4. Describe connection techniques for attaching multimedia equipment to a PC.
5. Define digital television standards including LDTV, SDTV, EDTV, and HDTV and describe how they relate to personal computers.
6. Differentiate between resolution formats associated with PC display monitors and digital televisions.
7. Describe the operation of the Universal Serial Bus.
8. List the events that occur when a key is depressed on the keyboard.
9. Describe the operation of a video capture card.
10. Install different types of mice and describe their operation.
11. Identify game port connectors used with joysticks and game paddles.
12. Describe the operation of flat-bed and bar code scanners.
13. Describe the physical aspects of a cathode-ray tube.
14. Explain how a single dot can be positioned anywhere on the face of the CRT, using raster scanning.

(continued)

OBJECTIVES (CONTINUED)

15. Describe how color images are created on a CRT video display screen.
16. Identify connection types associated with typical and advanced sound cards.
17. Describe the function of a shadow mask in a CRT monitor.
18. State the characteristics of the VGA video standard, including the type of physical connector specified for this video standard.
19. Identify standard PC-compatible resource allocations.
20. Differentiate between the operating characteristics of IEEE-1394 and USB ports.

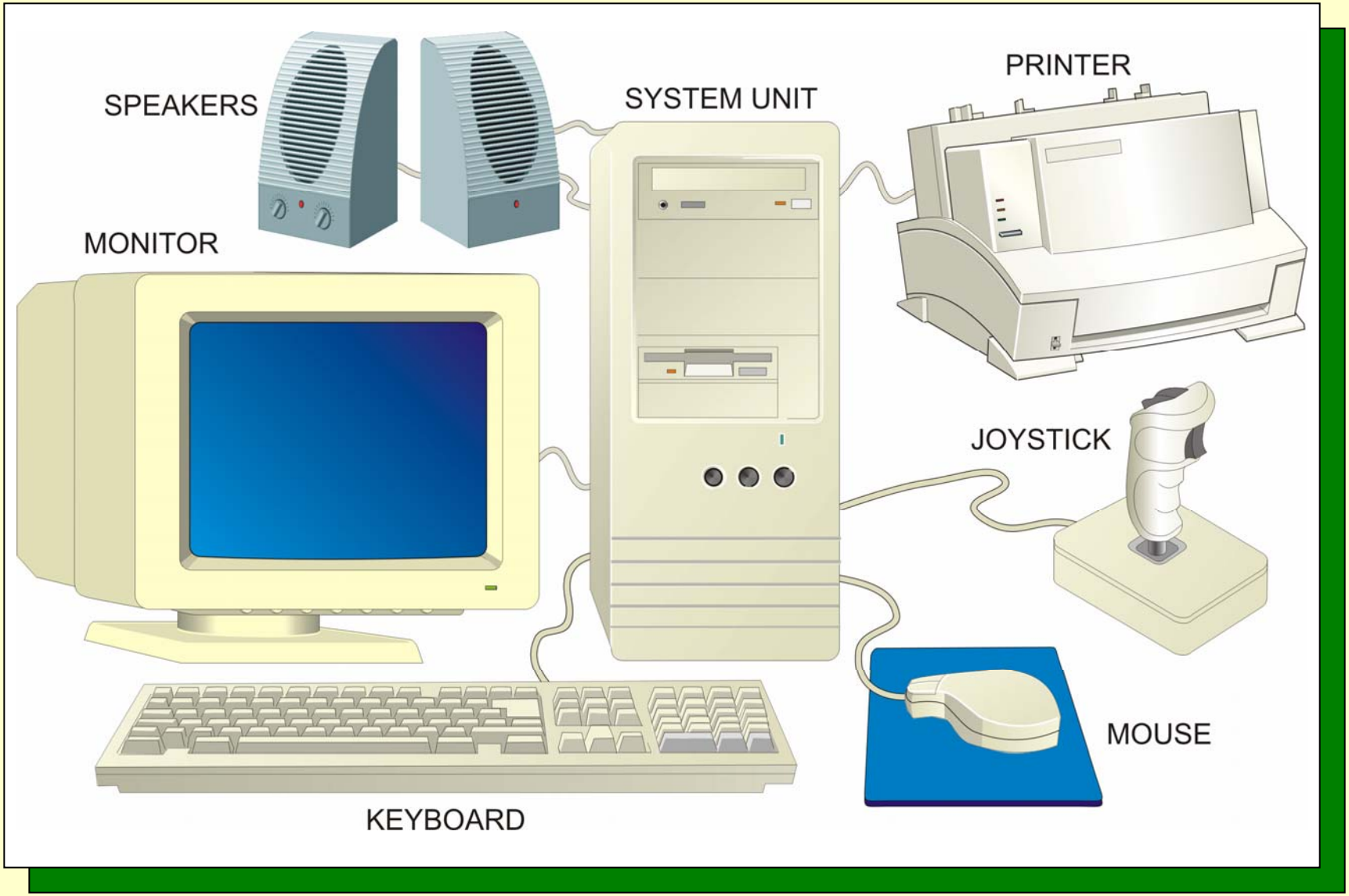

Figure 4-1: Common I/O Devices Used with PCs

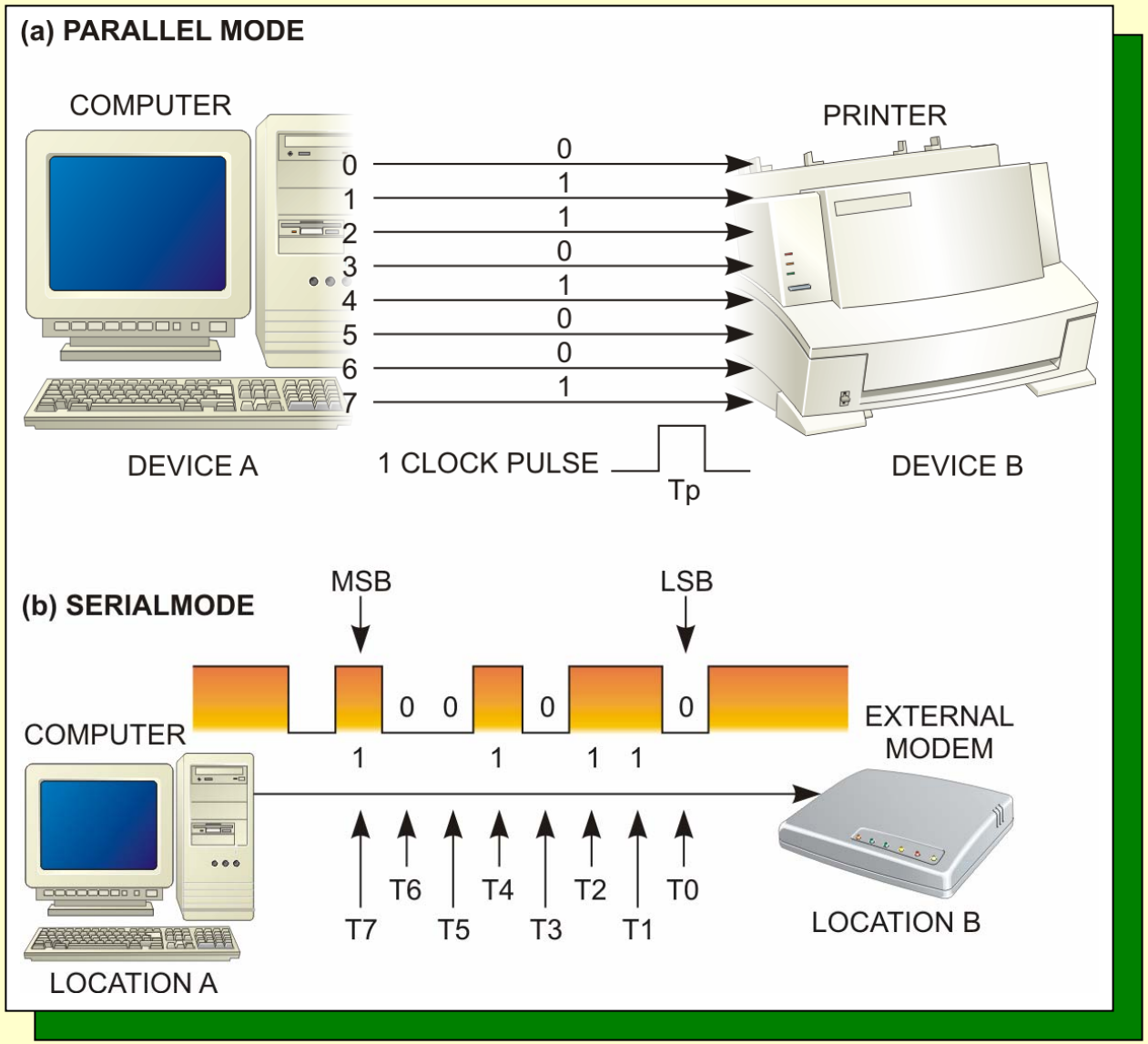

Figure 4-2: Parallel and Serial Data Transfers

Table 4-1: System Memory Map

ADDRESS	FUNCTION
0–3FF	Interrupt Vectors
400–47F	ROM-BIOS RAM
480–5FF	BASIC and Special System Function RAM
600–9FFFF	Program Memory
A0000–BFFFF	VGA/EGA Display Memory
B0000–B7FFF	Monochrome Display Adapter Memory
B8000–BFFFF	Color Graphics Adapter Memory
C0000–C7FFF	VGA/SVGA BIOS
C8000-CBFFF	EIDE/SCSI ROM (also older HDD Types)
D0000–D7FFF	Spare ROM
D0000–DFFFF	LAN Adapter ROM
E0000–E7FFF	Spare ROM
E8000–EFFFF	Spare ROM
F0000–F3FFF	Spare ROM
F4000–F7FFF	Spare ROM
F8000–FBFFF	Spare ROM
FC000–FDFFF	ROM BIOS
FE000–FFFFF	ROM BIOS

Table 4-2: I/O Port Addresses

HEX ADDRESS	DEVICE	USAGE
000–01F	DMA Controller (South Bridge)	System
020–03F	Interrupt Controller (South Bridge)	System
040–05F	Timer/Counter (South Bridge)	System
060–06F	Keyboard Controller	System
070–07F	Real-Time Clock, NMI Mask (South Bridge)	System
080–09F	DMA Page Register (South Bridge)	System
0A0–0BF	Interrupt Controller (South Bridge)	System
0F0	Clear Math Coprocessor Busy	System
0F1	Reset Math Coprocessor	System
0F8–0FF	Math Coprocessor	System
170–177	Second IDE Controller	I/O
1F0–1F7	First IDE Controller	I/O
200–207	Game Port	I/O
278–27F	Parallel Printer Port #2	I/O
2F8–2FF	Serial Port #2	I/O
378–37F	Parallel Printer Port #1	I/O
3B0–3BF	MGA/first Printer Port	I/O
3D0–3DF	CGA	I/O
3F0–3F7	FDD Controller	I/O
3F8–3FF	Serial Port #1	I/O
FF80-FF9F	USB Controller	I/O

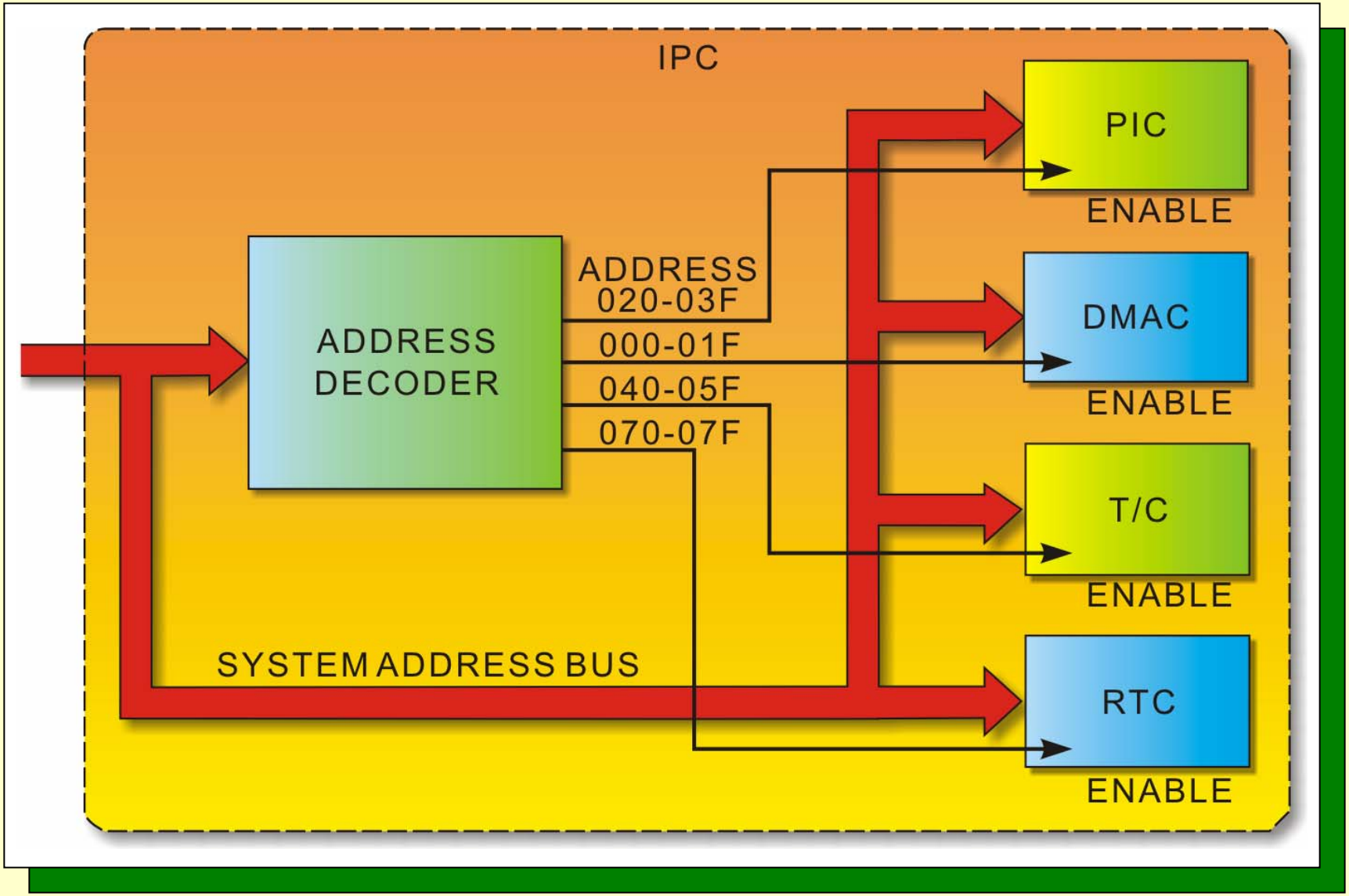

Figure 4-3: System Board I/O Address Decoding

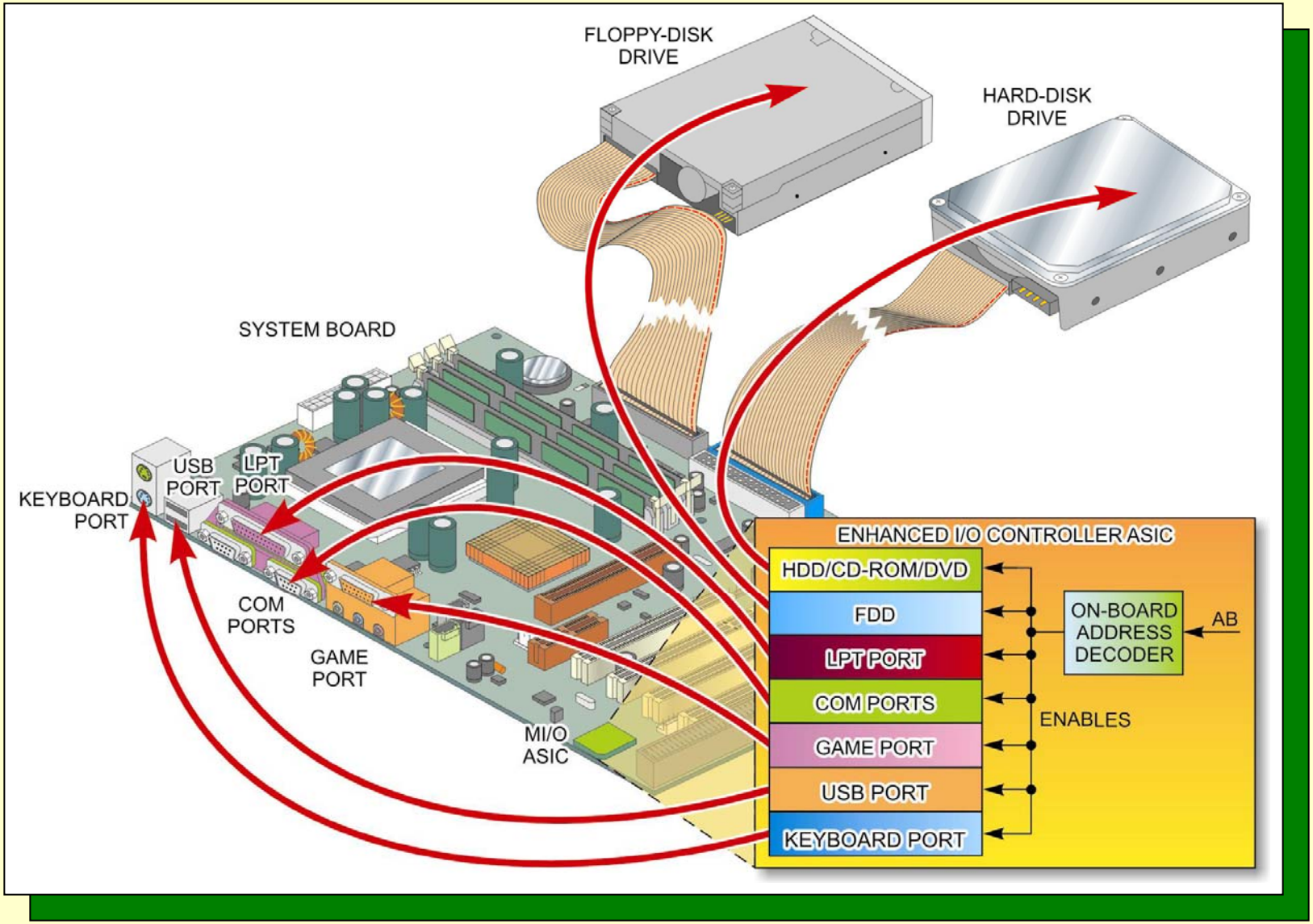

Figure 4-4: Addressing System Board I/O Port Controllers

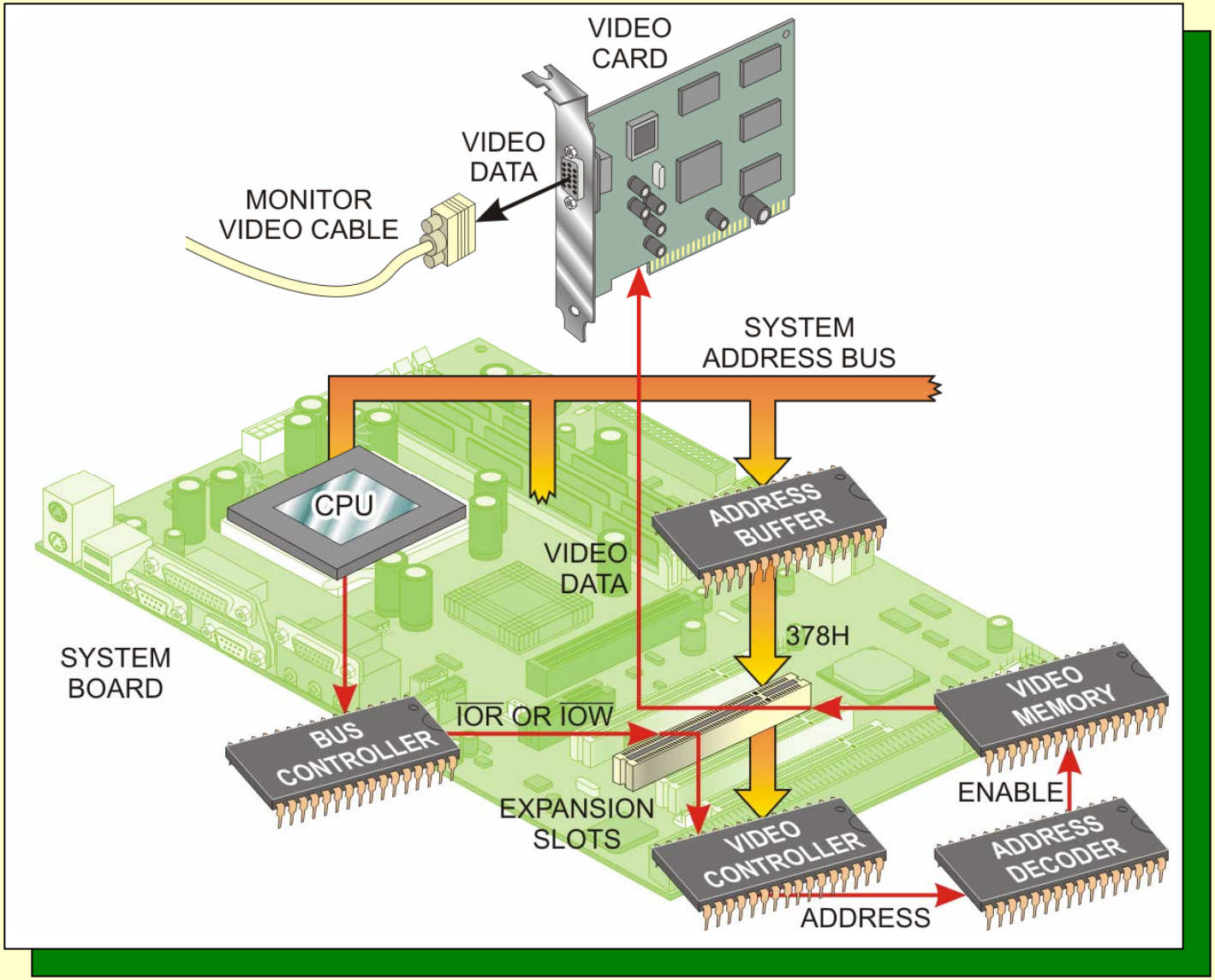

Figure 4-5: Address Routing to an I/O Port

Table 4-3: Decimal, Binary, and Hexadecimal Numbers

DECIMAL (10)	BINARY (2)	HEXADECIMAL (16)
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F
16	10000	10

Methods used to initiate data transfer between the system and the peripheral device:

- ***Polling*** **- where the microprocessor examines the status of the peripheral under program control.**
- ***Programmed I/O*** **- where the microprocessor alerts the designated peripheral by applying its address to the system's address bus.**
- ***Interrupt-driven I/O*** **- where the peripheral alerts the microprocessor that it's ready to transfer data.**
- ***DMA*** **- where the intelligent peripheral assumes control of the system's buses to conduct direct transfers with primary memory.**

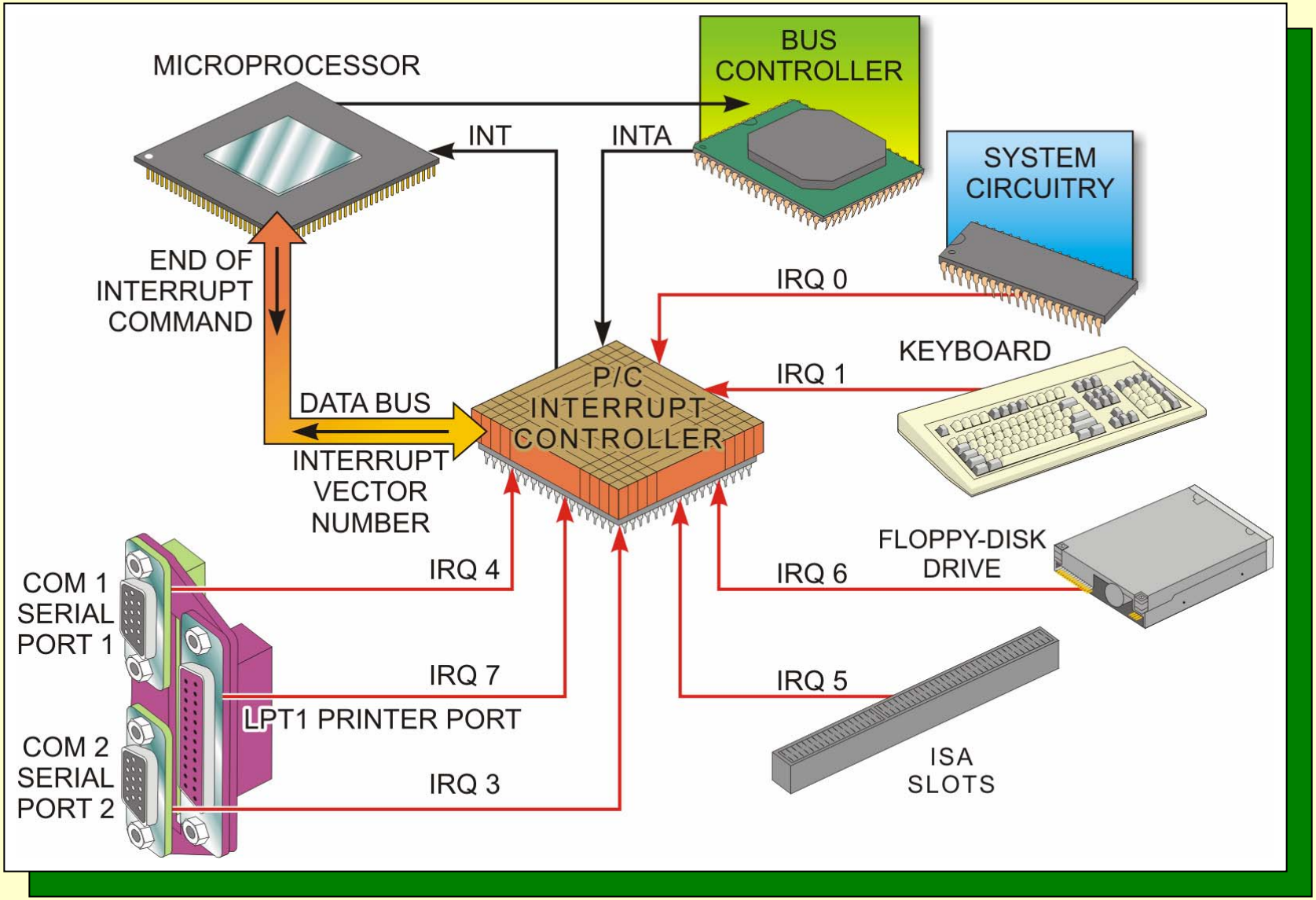

Figure 4-6: Programmable Interrupt Controller Channels

Two varieties of interrupts are used in PCs:

- ***Maskable interrupts (IRQs)*** **- which the computer can ignore under certain conditions**
- ***Non-maskable interrupts (NMI)*** **- which the microprocessor must always respond to**

Table 4-4: Traditional System Interrupt Levels

INTERRUPT	DESCRIPTION	INTERRUPT	DESCRIPTION
NMI	I/O CHANNEL CHECK OR PARITY CHECK ERROR		
INTC1		INTC2	
IRQ0	TIMER/COUNTER ALARM	IRQ8	REAL-TIME CLOCK
IRQ1	KEYBOARD BUFFER FULL	IRQ9	SPARE
IRQ2	CASCADE FROM INTC2	IR110	SPARE
IRQ3	SERIAL PORT 2	IRQ11	SPARE
IRQ4	SERIAL PORT 1	IRQ12	SPARE PS/2 MOUSE
IRQ5	PARALLEL PORT 2	IRQ13	COPROCESSOR
IRQ6	FDD CONTROLLER	IRQ14	PRIMARY IDE CTRL
IRQ7	PARALLEL PORT 1	IRQ15	SECONDARY IDE CTRL

TEST TIP

Memorize the system resources available in an ISA-compatible system and what their typical assignments are.

TEST TIP

Know what types of problems can cause an NMI to occur.

GEEK SQUAD CASE FILE #77870

Don S., Special Agent 67 is adding a wide carriage dot matrix printer to his workstation so that he can print multipart forms. He already has a color ink-jet printer attached to the computer using IRQ7. He has no idea of which resources to assign to the new printer. What will you tell him when he asks for help?

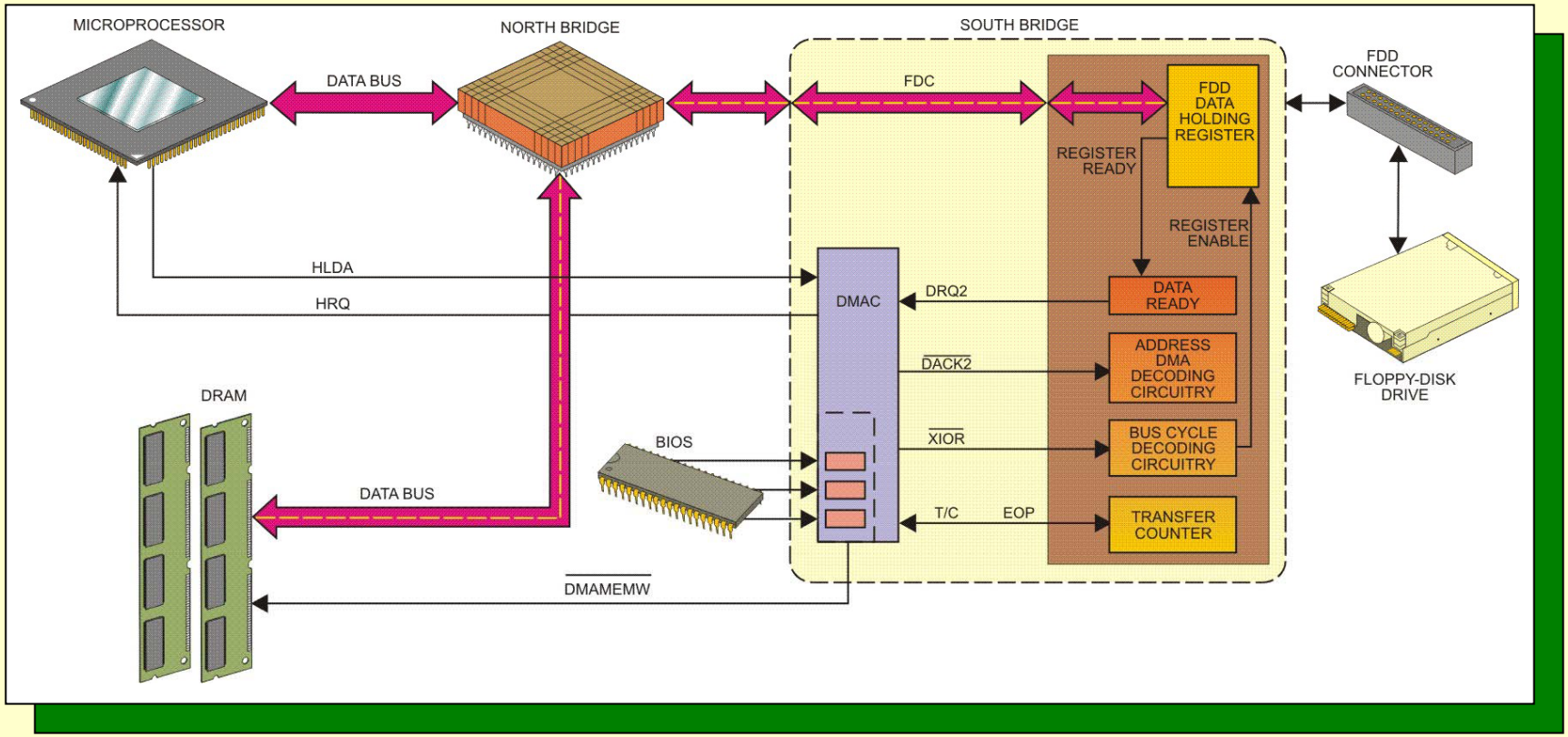

Figure 4-7: DMA Operations

Table 4-5: Traditional DMA Channel Allocations

CHANNEL	FUNCTION	CONTROLLER	PAGE REGISTER ADDRESS
CH0	SPARE	1	0087
CH1	SDLC (NETWORK)	1	0083
CH2	FDD CONTROLLER	1	0082
CH3	SPARE	1	0081
CH4	CASCADE TO CNTR 1	2	
CH5	SPARE	2	008B
CH6	SPARE	2	0089
CH7	SPARE	2	008A

Most intelligent devices in the PC system will require at least two of the following system resources:

- **IRQ interrupt channels**
- **DMA channels**
- **I/O port address allocations**
- **Buffer memory address allocation (in system RAM)**

TEST TIP

Memorize the I/O port addresses for the first and second IDE controllers.

TEST TIP

Memorize the system resources that the PC typically assigns to parallel ports.

TEST TIP

Know the system addresses and other resources that a PC-compatible system uses for serial ports. It may be helpful to remember that IBM set up these standards so that the odd-numbered COM ports use the even-numbered IRQ channel, and vice versa.

GEEK SQUAD CASE FILE #13345

One of the CIA agents has called you because he is working on a system that has several legacy devices installed and he does not remember what resources are assigned to typical devices in a PC-compatible system. He needs you to fax him a list of these devices. Because you have become a very successful Geek Squad technician, you are on a cruise and do not have access to your resource materials. What information can you send the agent from your memory?

The standard I/O port types commonly found on new computers include:

- **PS/2 keyboard and mouse ports**
- **USB ports**
- **Firewire ports**
- **Infrared ports**

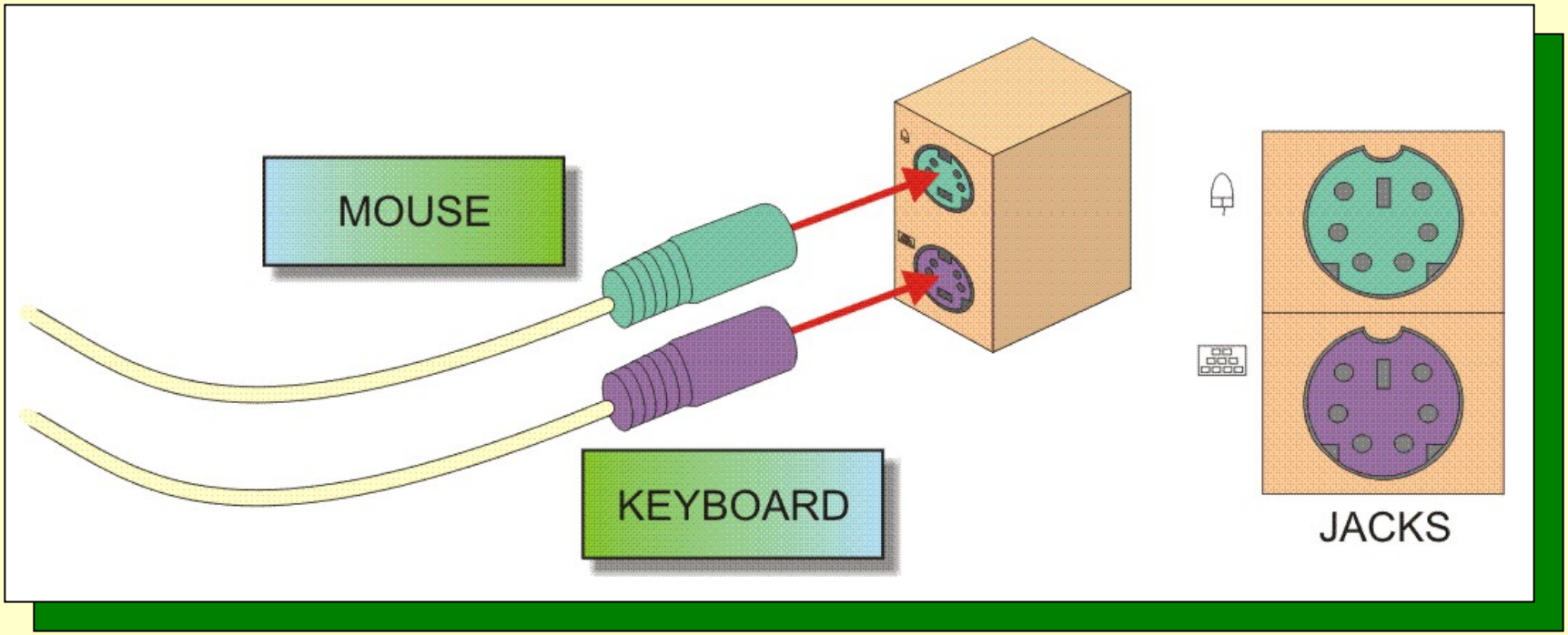

Figure 4-8: Mouse and Keyboard Connectors

TEST TIP

Be aware that it is quite possible to confuse the PS/2 mouse and keyboard connections on most PC systems.

TEST TIP

Be aware that plugging non-hot-swappable devices such as the keyboard into the system while it is turned on can damage parts of the system.

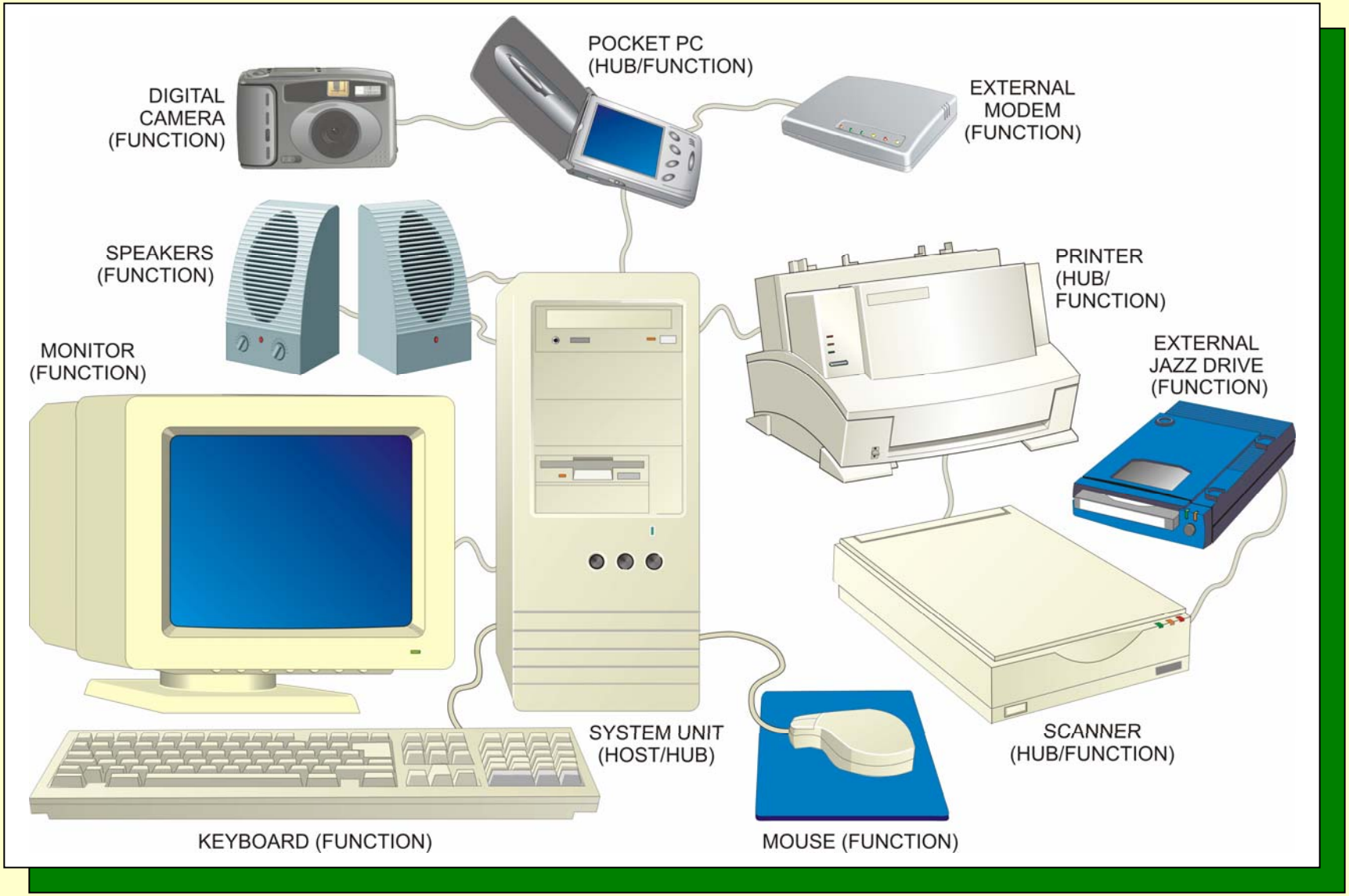

Figure 4-9: USB Desktop Connection Scheme

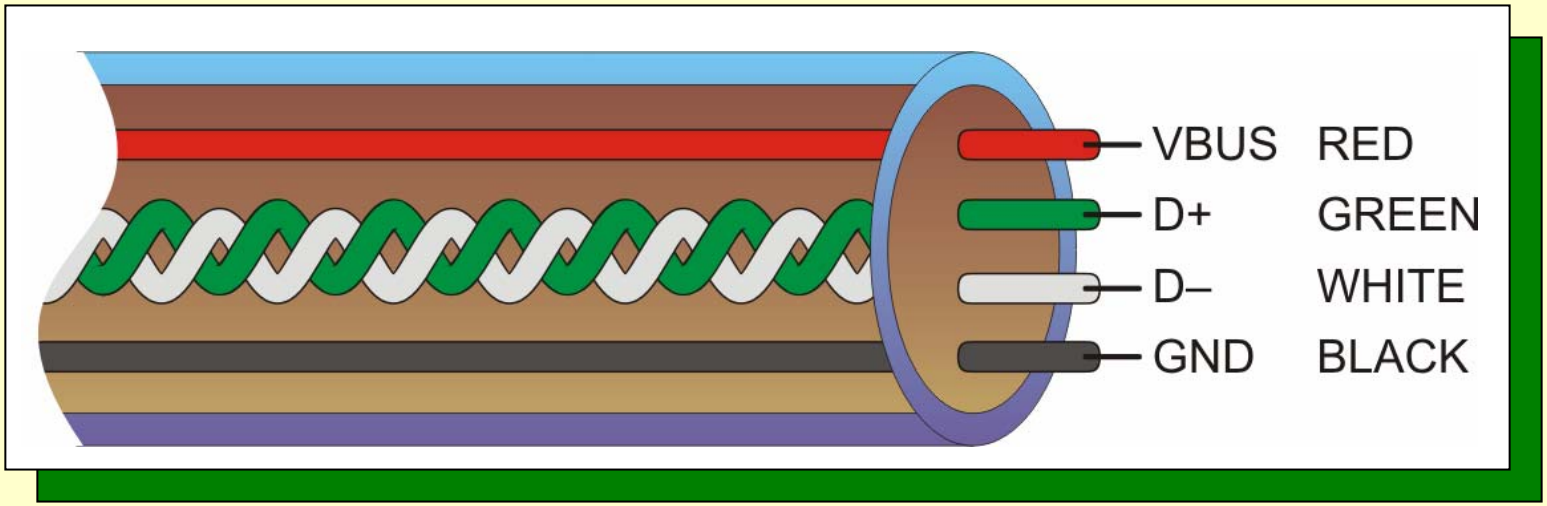

Figure 4-10: The USB Cable

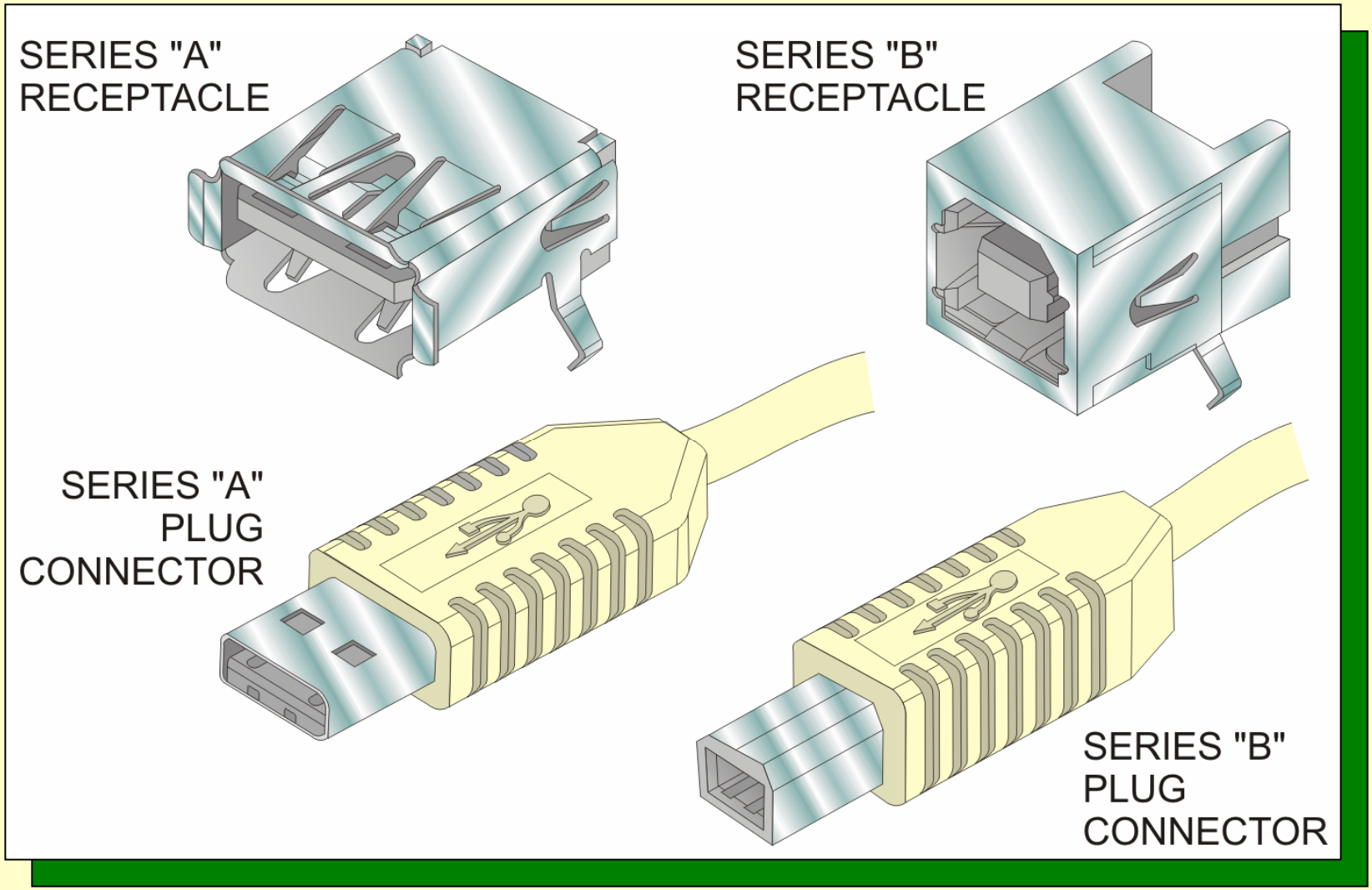

Figure 4-11: USB Connectors

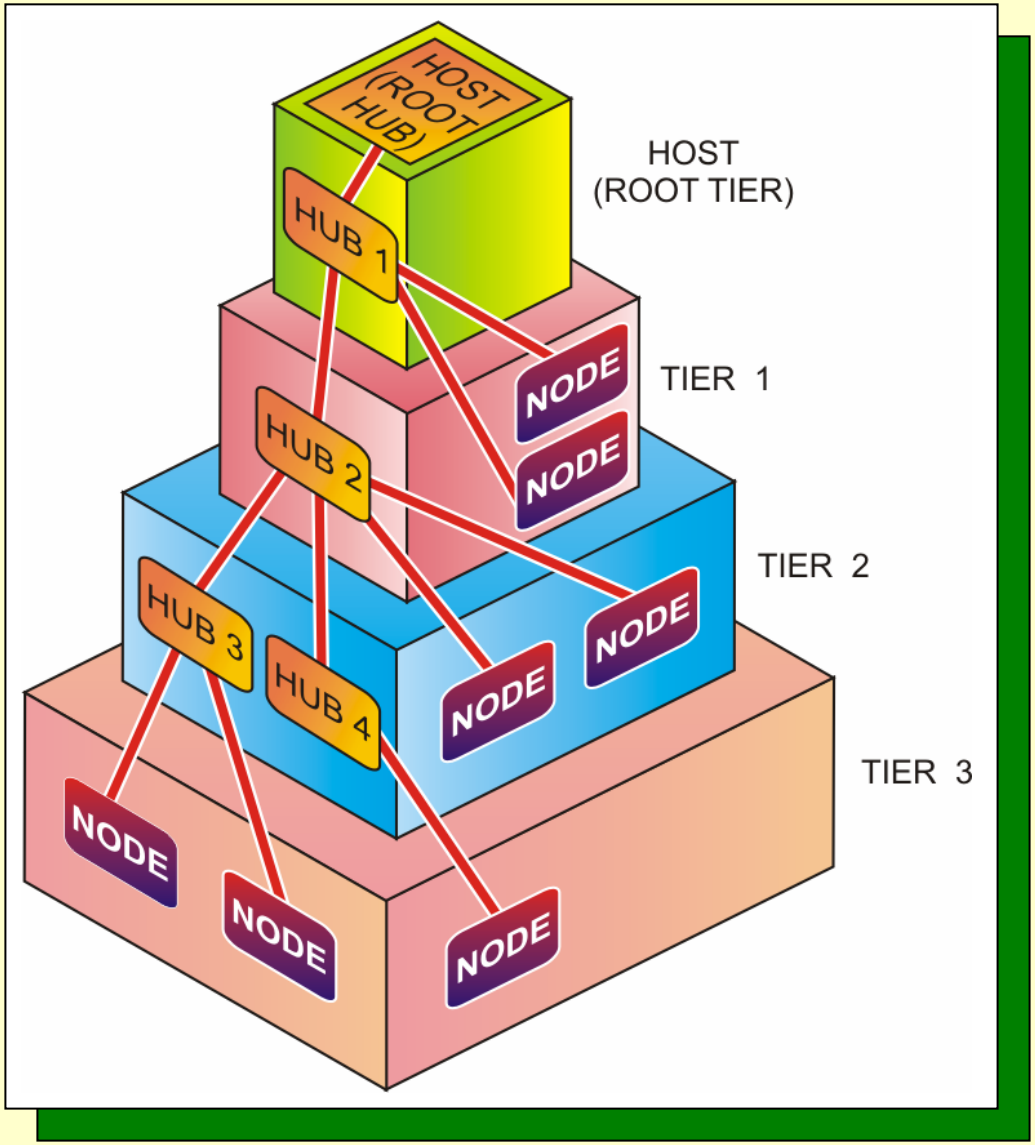

Figure 4-12: Universal Serial Bus Architecture

TEST TIP

Memorize the number of devices that can be attached to a USB port.

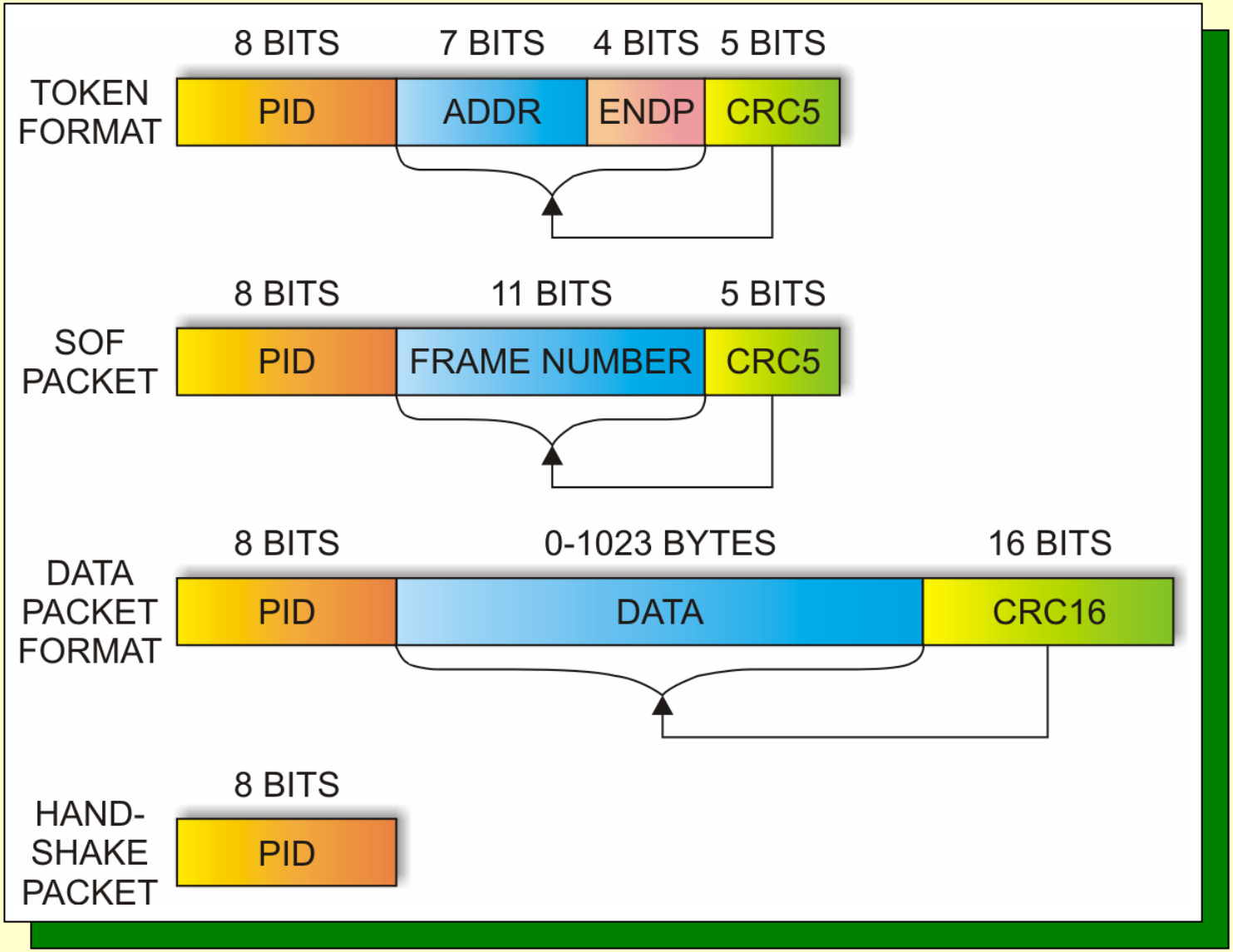

Figure 4-13: USB Packet Formats

The USB specification provides for the following four types of transfers to be conducted:

- ***Control transfers*** **are used by the system to configure devices at startup or time of connection. Other software can use control transfers to perform other device-specific operations.**

- ***Bulk data transfers*** **are used to service devices that can handle large batches of data (scanners and printers, for example). Bulk transfers are typically made up of large bursts of sequential data. The system arranges for bulk transfers to be conducted when the bus has plenty of capacity to carry out the transfer.**

(continued)

The USB specification provides for the following four types of transfers to be conducted: (continued)

- ***Interrupt transfers*** **are small, spontaneous transfers from a device that are used to announce events, provide input coordinate information, or transfer characters.**

- ***Isochronous transfers*** **involve large streams of data. This format is used to move continuous, real-time data streams such as voice or video. Data delivery rates are predetermined and correspond to the sampling rate of the device.**

TEST TIP

Be aware of the USB high-speed data streaming mode.

TEST TIP

Know the length limits for full- and low-speed USB devices. It should help you to remember that the low-speed distance is actually shorter than the high-speed length.

TEST TIP

Be aware that the Firewire bus is faster than the USB bus.

TEST TIP

Remember how many devices can be attached to a single IEEE-1394 port.

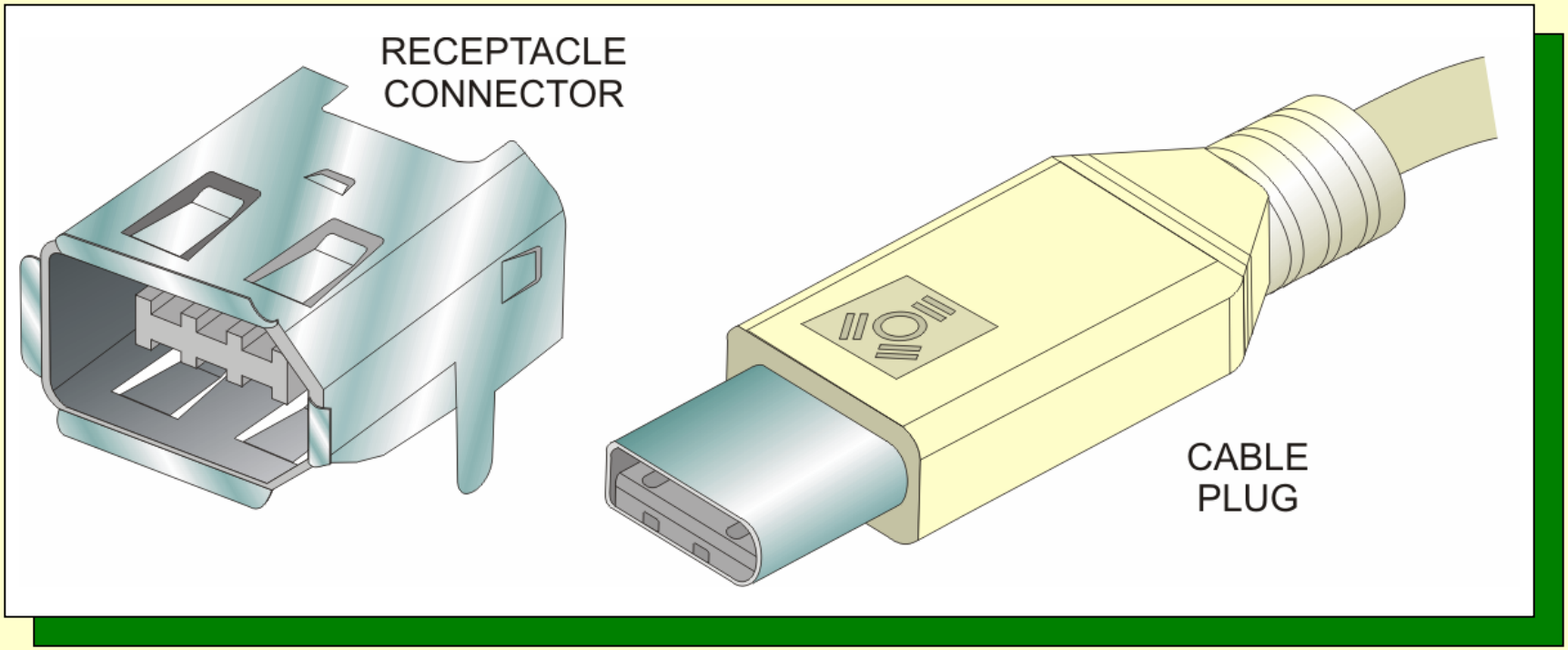

Figure 4-14: Firewire Plug and Connector

GEEK SQUAD CASE FILE #27846

The ACME company is moving strongly into multimedia systems that include professional electronic music and video devices. Their boss has asked the local Geek Squad which type of interface the company should standardize on. What should you tell their boss about this?

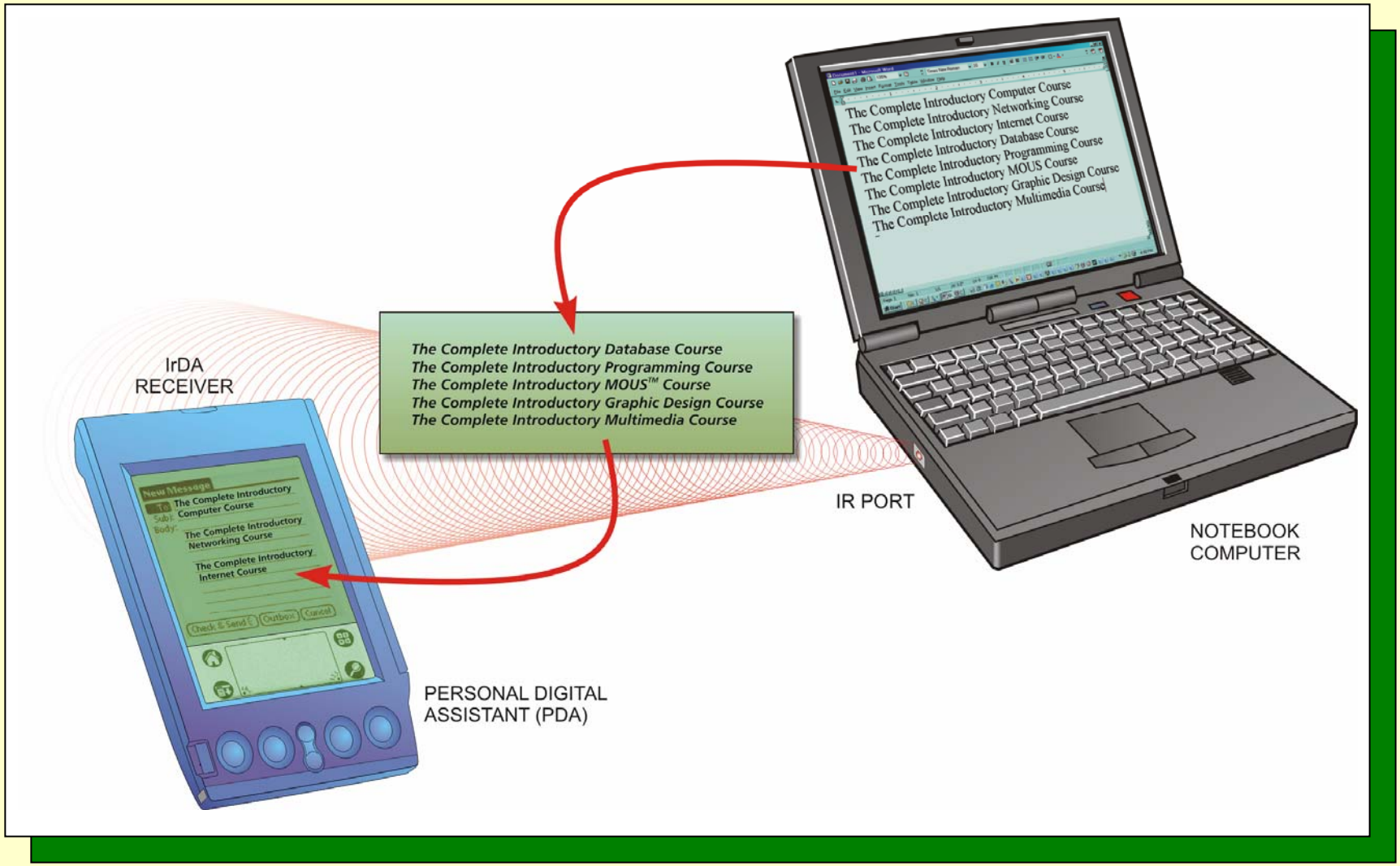

Figure 4-15: An IrDA Device Connection

The IrDA standard specifies four protocols that are used with different types of devices:

- ***IrLPT*** **- This is used with character printers to provide a wireless interface between the computer and the printer.**
- ***IrDA-SIR*** **- The standard infrared protocol used to provide a standard serial port interface with transfer rates ranging up to 115 kbps.**
- ***IrDA-FIR*** **- The fast infrared protocol used to provide a high-speed serial port interface with transfer rates ranging up to 4 Mbps.**

(continued)

The IrDA standard specifies four protocols that are used with different types of devices: (continued)

- ***IrTran-P*** **- This is used to provide a digital image transfer standard for communications with digital image capture devices.**

TEST TIP

Remember that the IrLPT port is a new, high-speed printer interface that can be used to print from a wide array of computing devices.

GEEK SQUAD CASE FILE #28856

Special Agent 632 is setting up an IrDA printer in a remote location. He has called you because he cannot get the system to see the infrared printer connection. To check the printer, the agent connected it to the host computer using a normal parallel interface and it ran successfully. Which items should you suggest that Agent 632 check to verify the operation of the infrared port?

Figure 4-16: Media Center Components

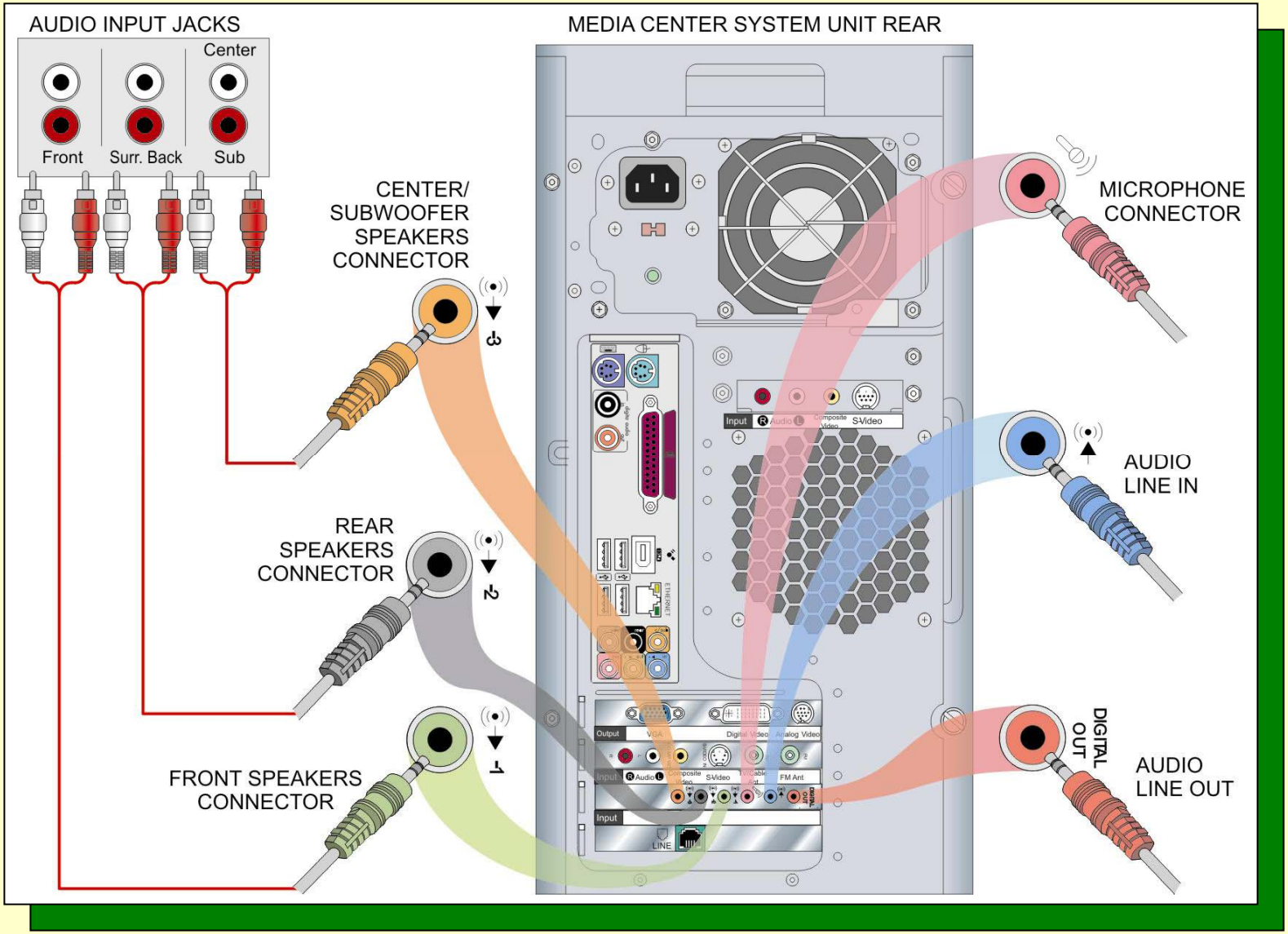

Figure 4-17: Audio Connection Methods

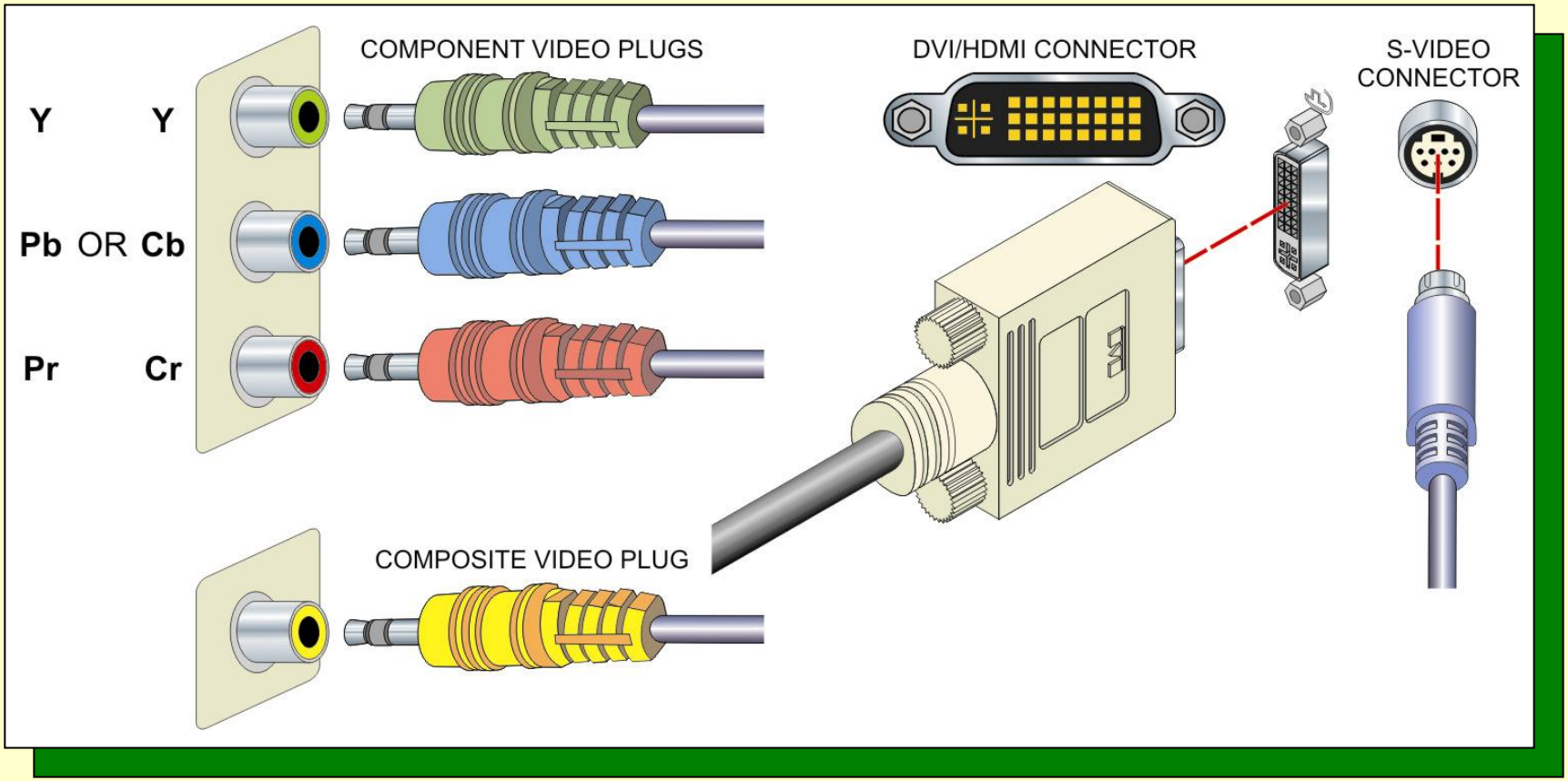

Figure 4-18: Advanced Video Connection Options

Different video connection options adopted from the consumer A/V market:

- **Composite Video - a video connection scheme where all video color and synchronization information is transmitted as one combined signal. These cables and connectors are typically color coded yellow. This is typically the cheapest and lowest quality method of transporting audio signals.**

(continued)

Different video connection options adopted from the consumer A/V market: (continued)

- **Component Video - an analog video connection method where three color video signals (red, green, blue - RGB) are transmitted on separate lines and combined inside the video equipment. Luminance and synchronization signals are added to one or more of the color signal line. This method delivers signal quality levels between the composite video and the S-video method described next. Component video connections are typically color coded as red, blue, and green.**

Digital component video can be used with 480p, 720p, 1080i, and 1080p video display systems.

- ***S-video*** **- a high-performance multi-pin video cable and connector specification that splits the video signal into separate color components, chrominance, and luminance channels to provide high-quality video output.**

- ***Digital Video Interface (DVI)*** **- a relatively new video signal connection scheme adopted from high-definition (HD) television systems. DVI is a video-only connection scheme. DVI can deliver quality video in video systems running resolutions up to 1080p.**

(continued)

Digital component video can be used with 480p, 720p, 1080i, and 1080p video display systems. (continued)

- **High-definition multimedia interface (HDMI) - an advanced version of the DVI interface that offers high definition video and multichannel (up to 8) audio transfers in a single cable. Like the DVI interface, HDMI is capable of handling signals for video systems running resolutions up to 1080p.**

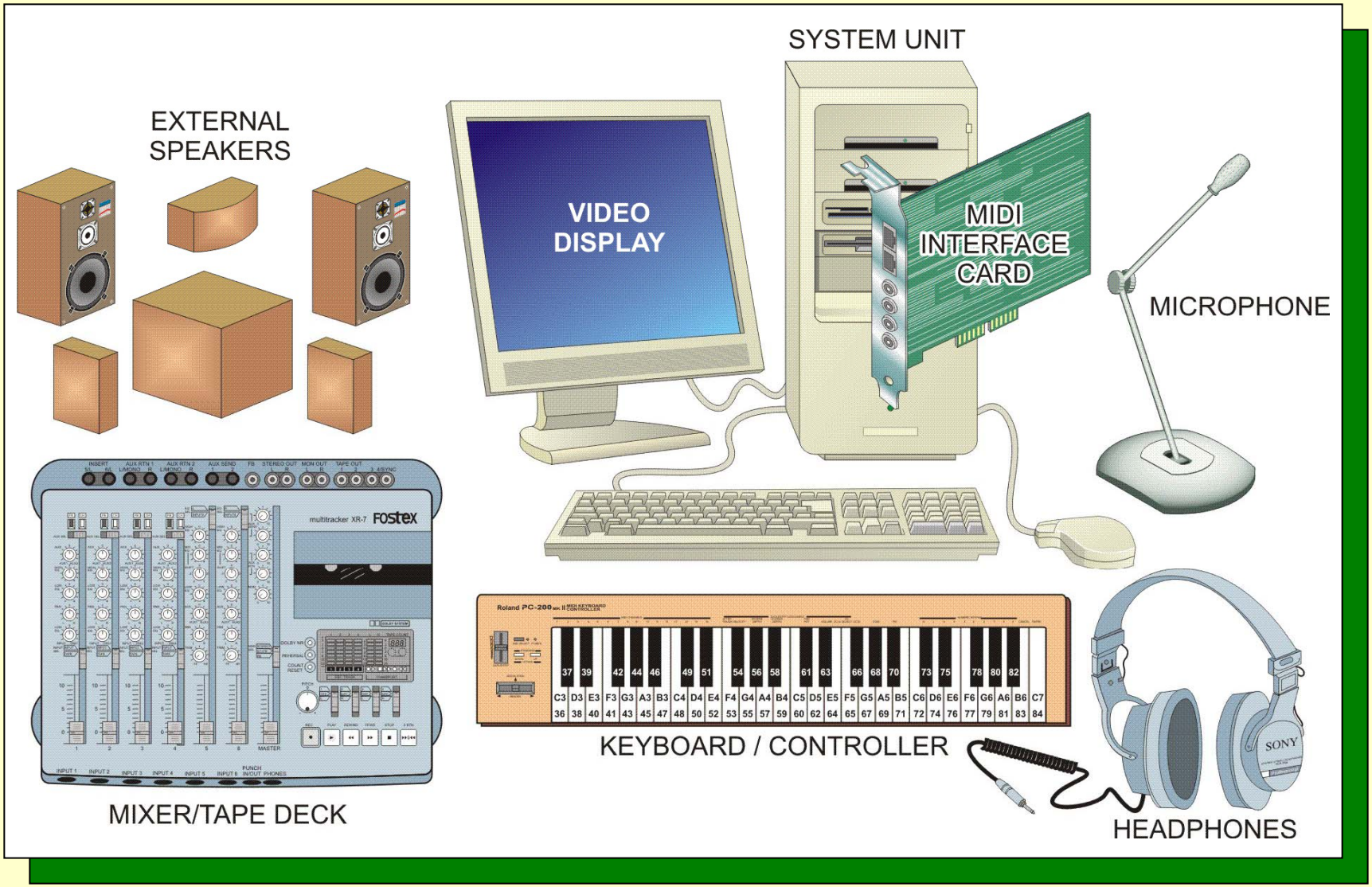

Figure 4-19: A Typical MIDI System

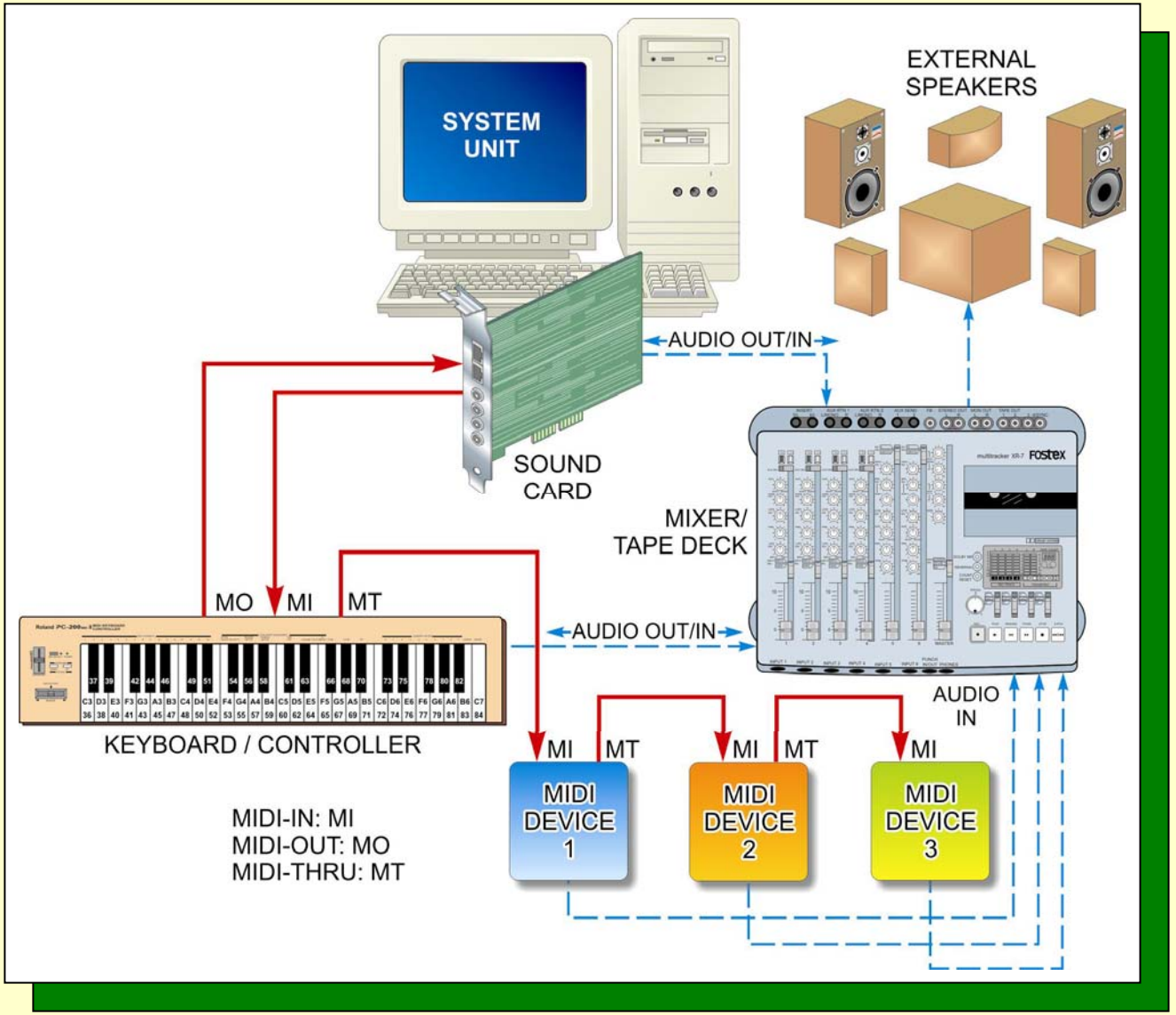

Figure 4-20: MIDI Cable Connections

There are three port types that have been I/O standards since the original IBM PCs were introduced:

- **Centronic parallel ports**
- **RS-232C serial ports**
- **Game ports**

Table 4-6: Typical I/O Ports

PORT	CONNECTOR
Keyboard	PS/2 6-pin mini-DIN
Mouse	PS/2 6-pin mini-DIN
COM1	DB-9M
COM2	DB-9M
LPT	DB-25F
VGA	DB-15F (3 row)
Game	DB-15F (2 row)
Modem	RJ-11
LAN	BNC/RJ-45
Sound	RCA 1/8" mini or 3/32" sub mini-jacks
SCSI	Centronics 50-pin
USB	4-pin USB Socket

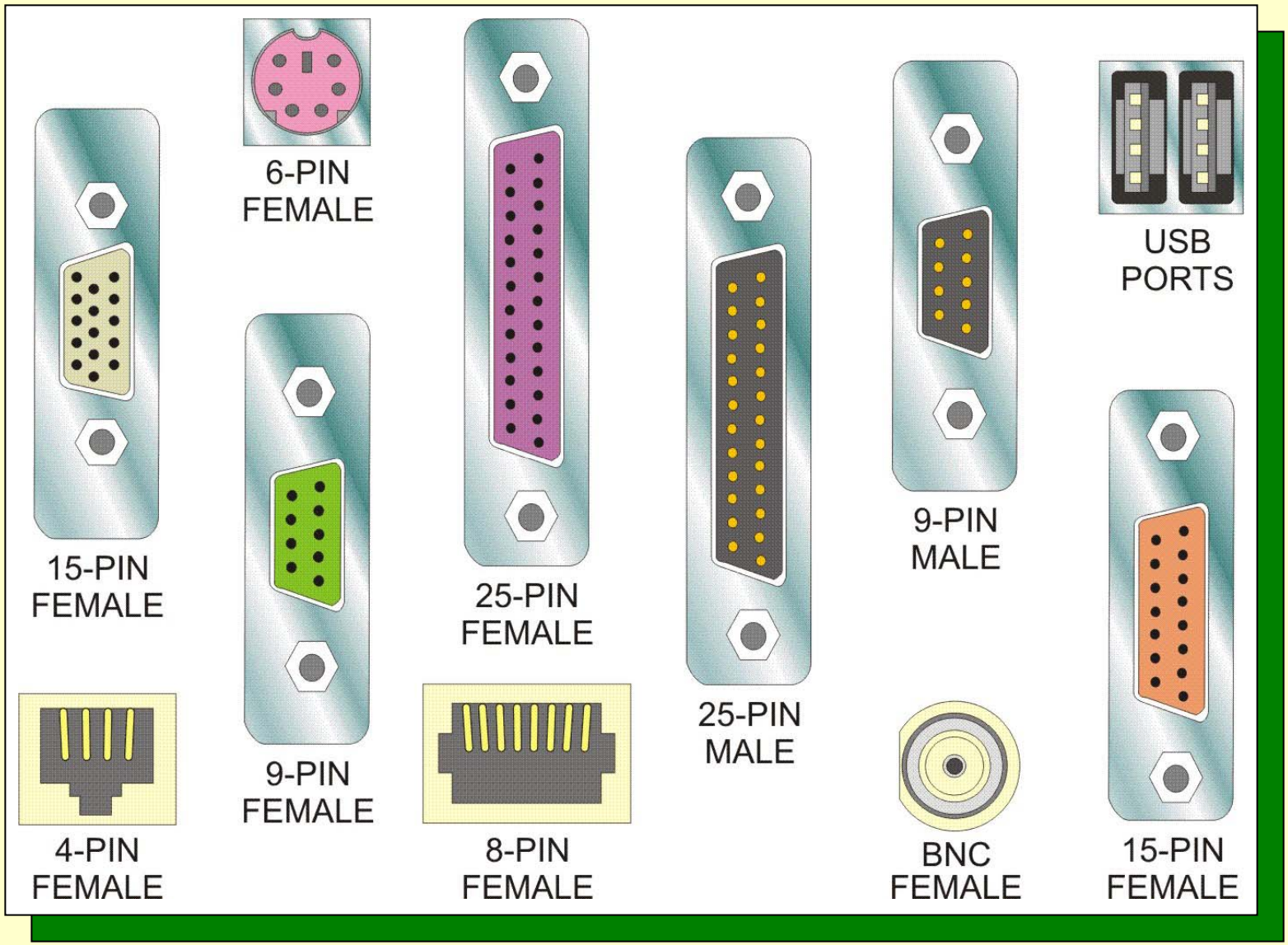

Figure 4-21: Typical I/O Port Connectors

TEST TIP

Memorize the appearance, type, and pin configuration of the standard PC port connectors (i.e., parallel ports use 25-pin female D-shell connectors).

GEEK SQUAD CASE FILE #97972

Your store has been called in to set up a network in a corporate office, and you are in charge of making the physical connections made to all the machines. In the CFO's office, you encounter a machine that has been running on a small accounting network for some years but doesn't have an RJ-45 jack for the network cable. How can this be, and what should you do about it?

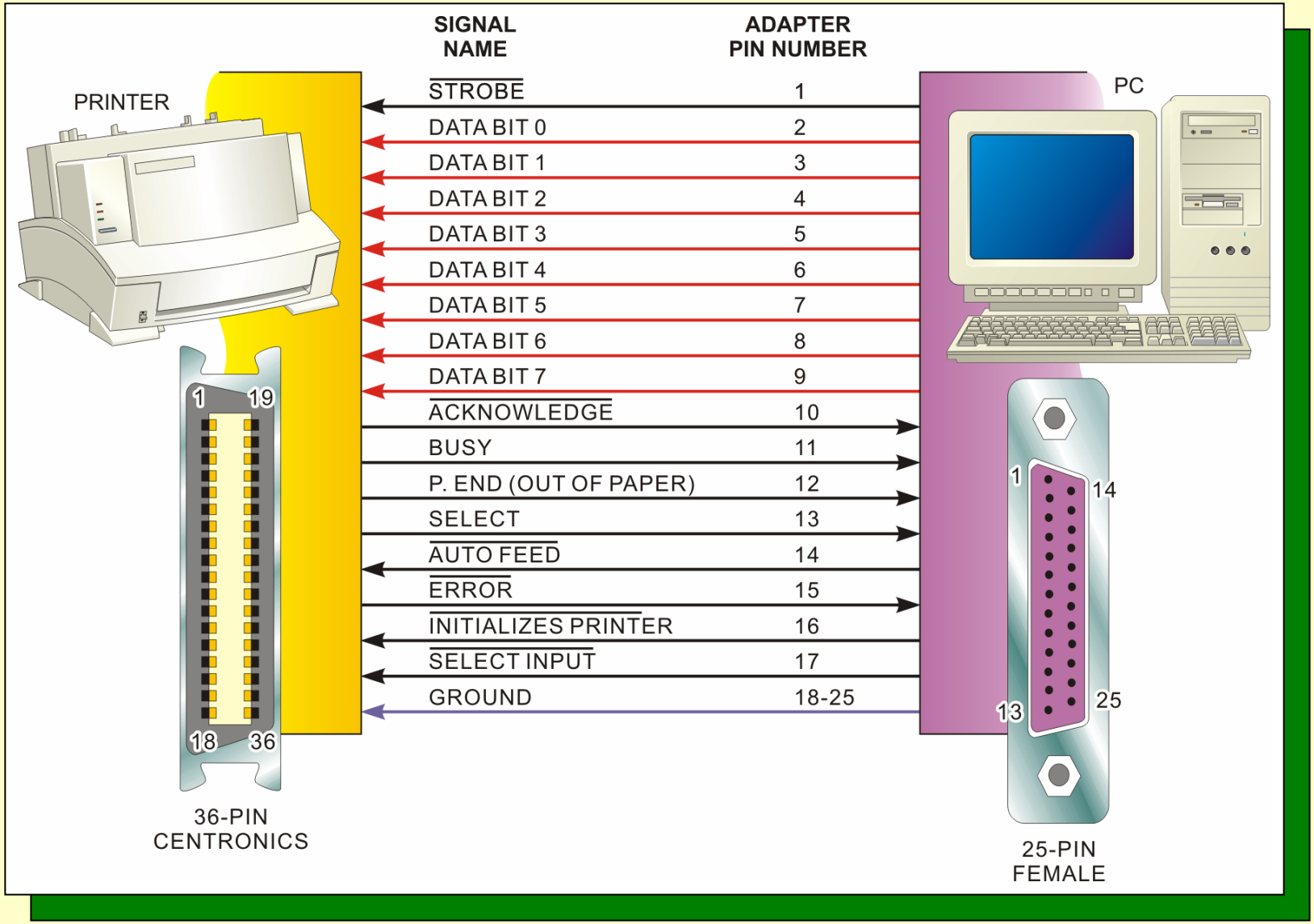

Figure 4-22: Parallel-Port Connector and Signals

TEST TIP

Know the recommended length of a standard parallel printer cable.

TEST TIP

As you study the I/O ports in this chapter, be aware of which ports provide bidirectional, half-duplex, and full-duplex operation.

TEST TIP

Remember that the ECP specification employs DMA operations to provide the highest data throughput for a parallel port.

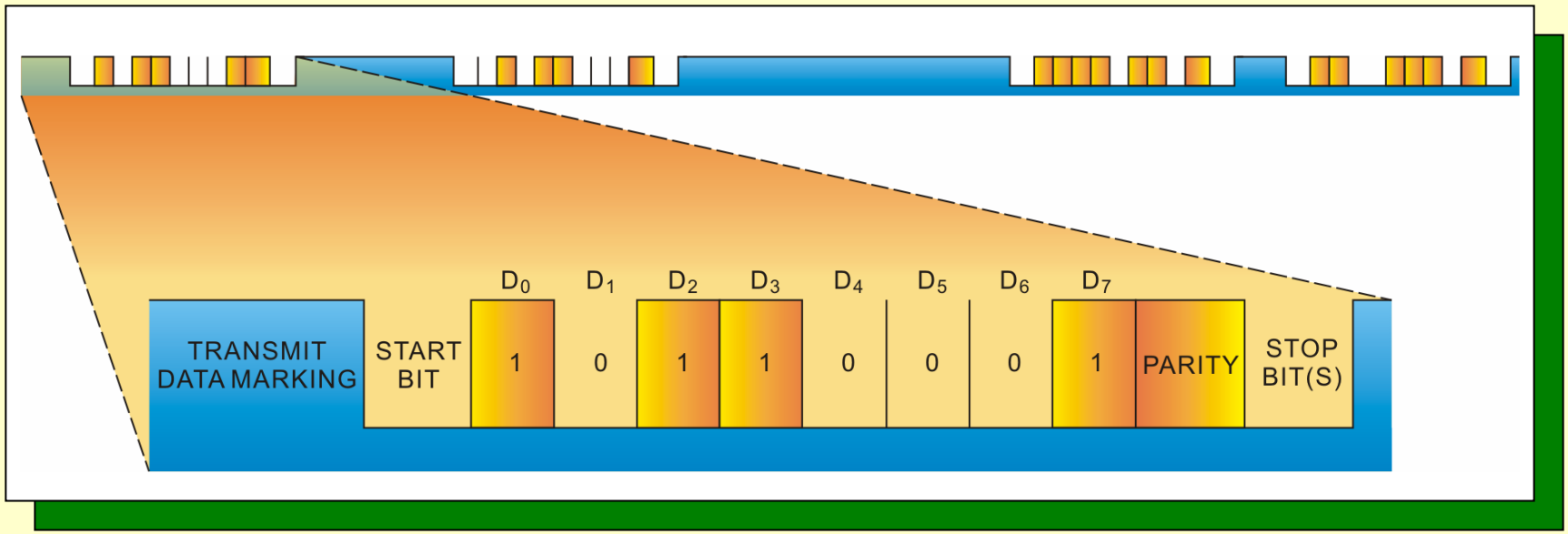

Figure 4-23: Asynchronous Transmission

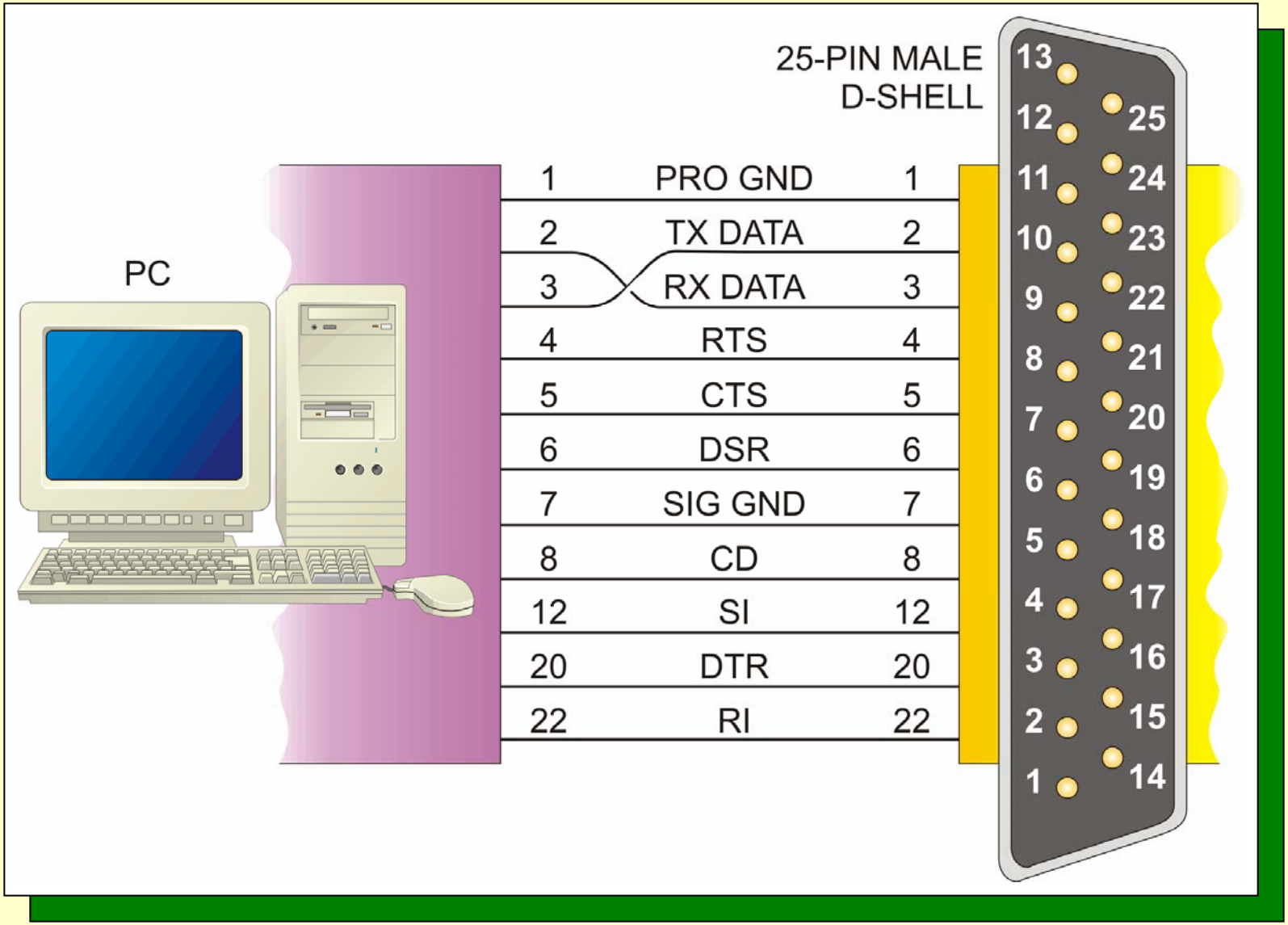

Figure 4-24: RS-232C Connector

TEST TIP

Know the maximum recommended length of an RS-232 cable.

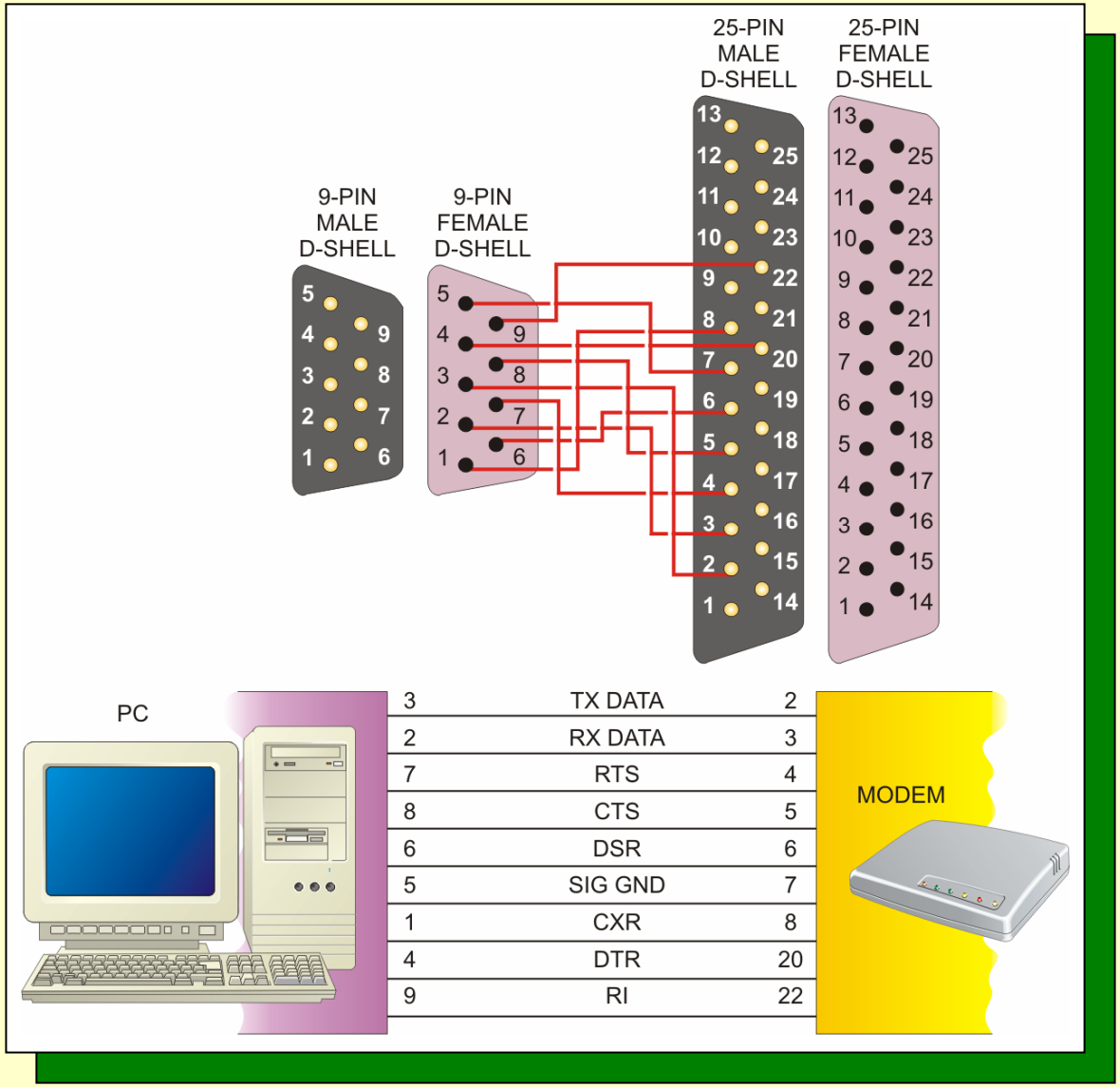

Figure 4-25: A 9-Pin to 25-Pin RS-232 Cable

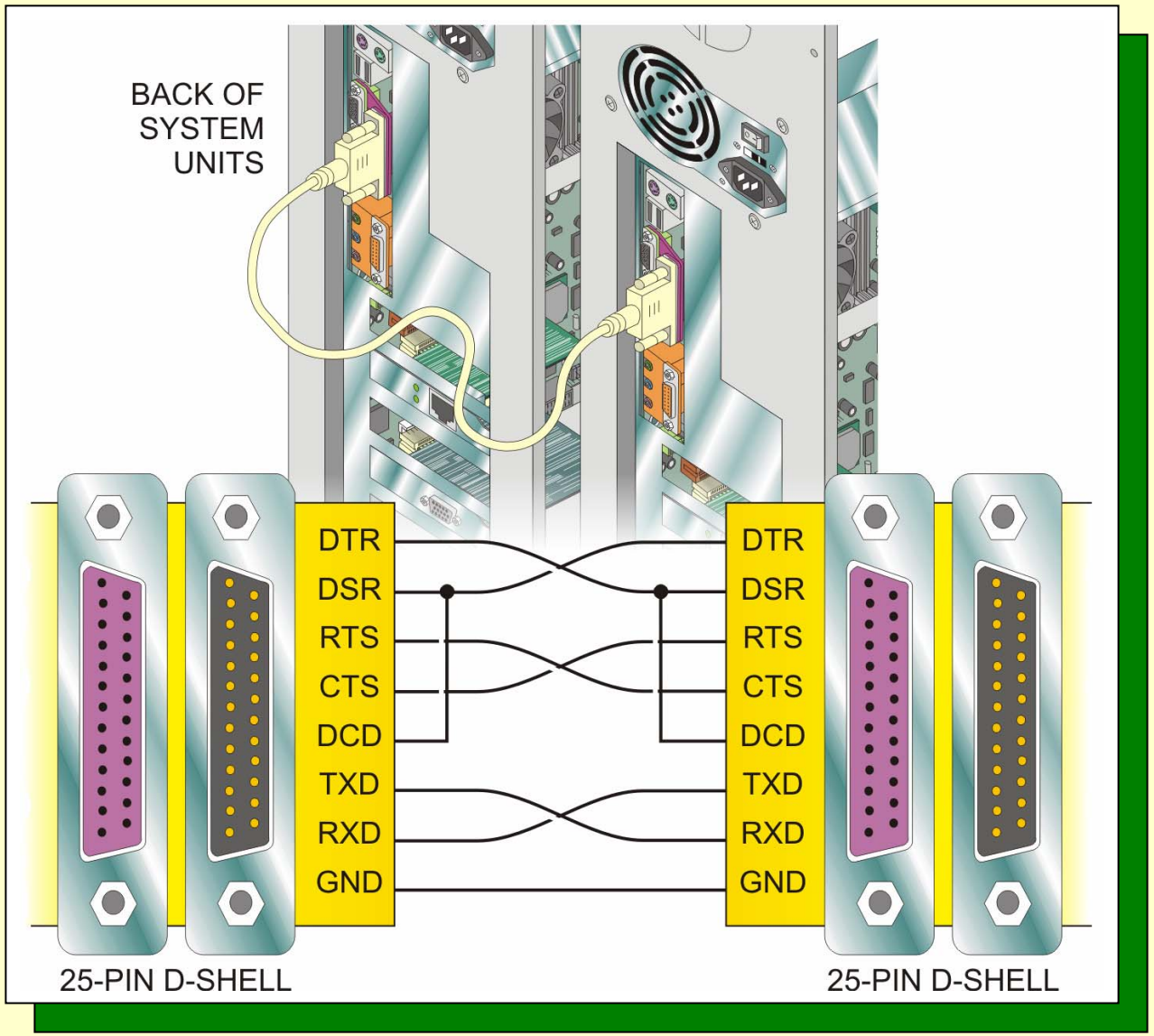

Figure 4-26: A Null Modem Cable

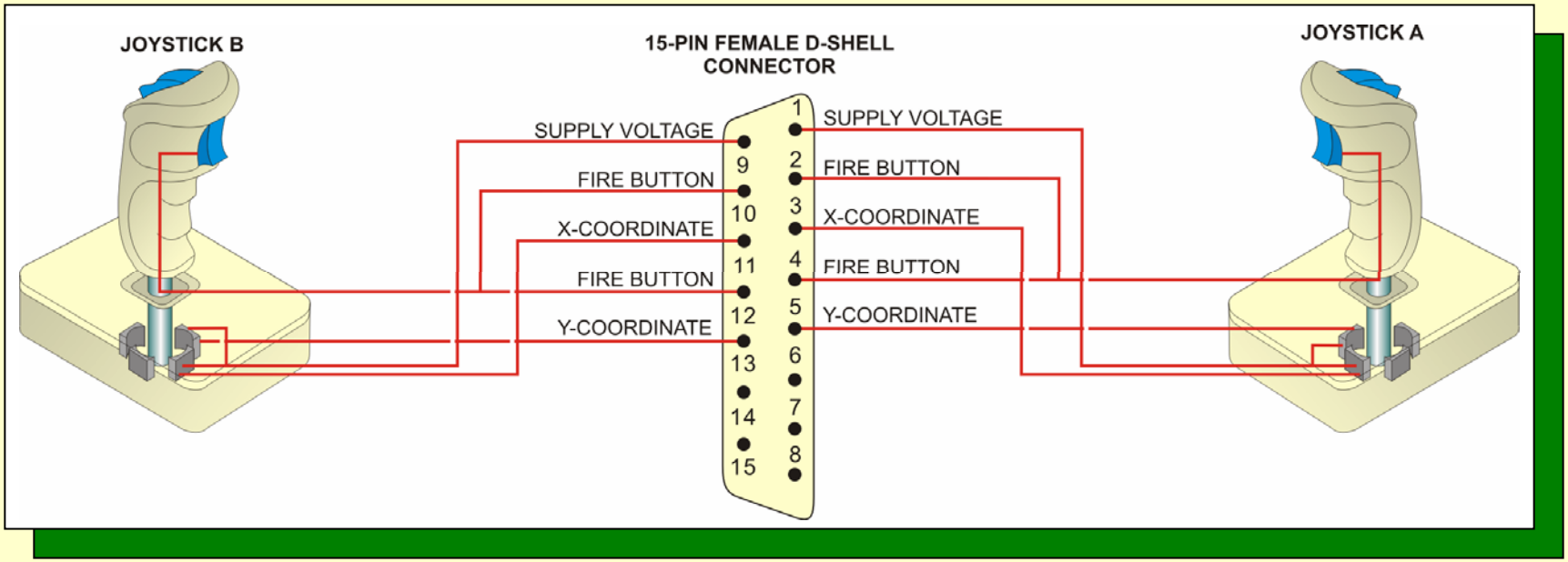

Figure 4-27: Game-Port Connections

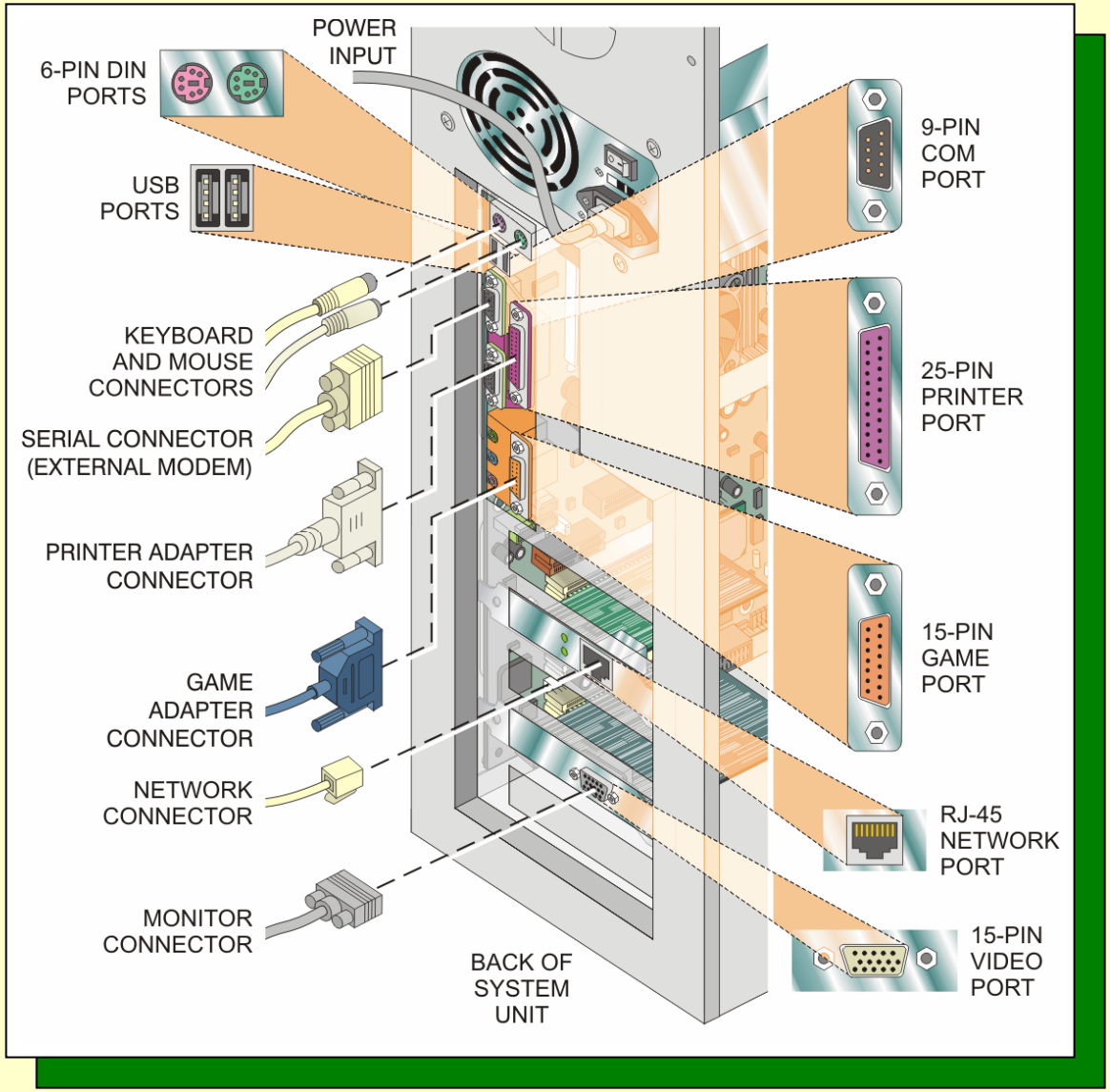

Figure 4-28: External Connections

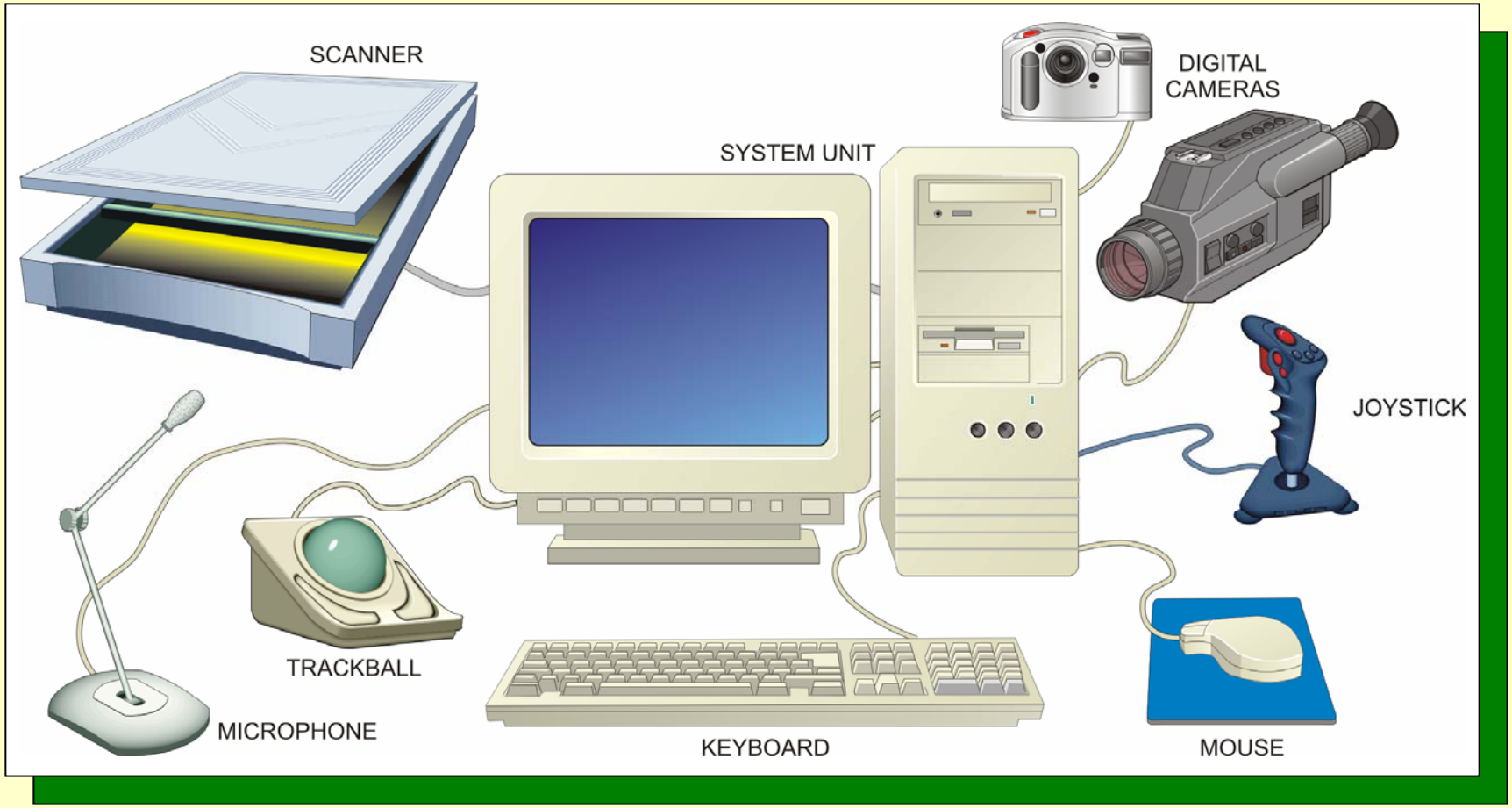

Figure 4-29: Typical Input Devices

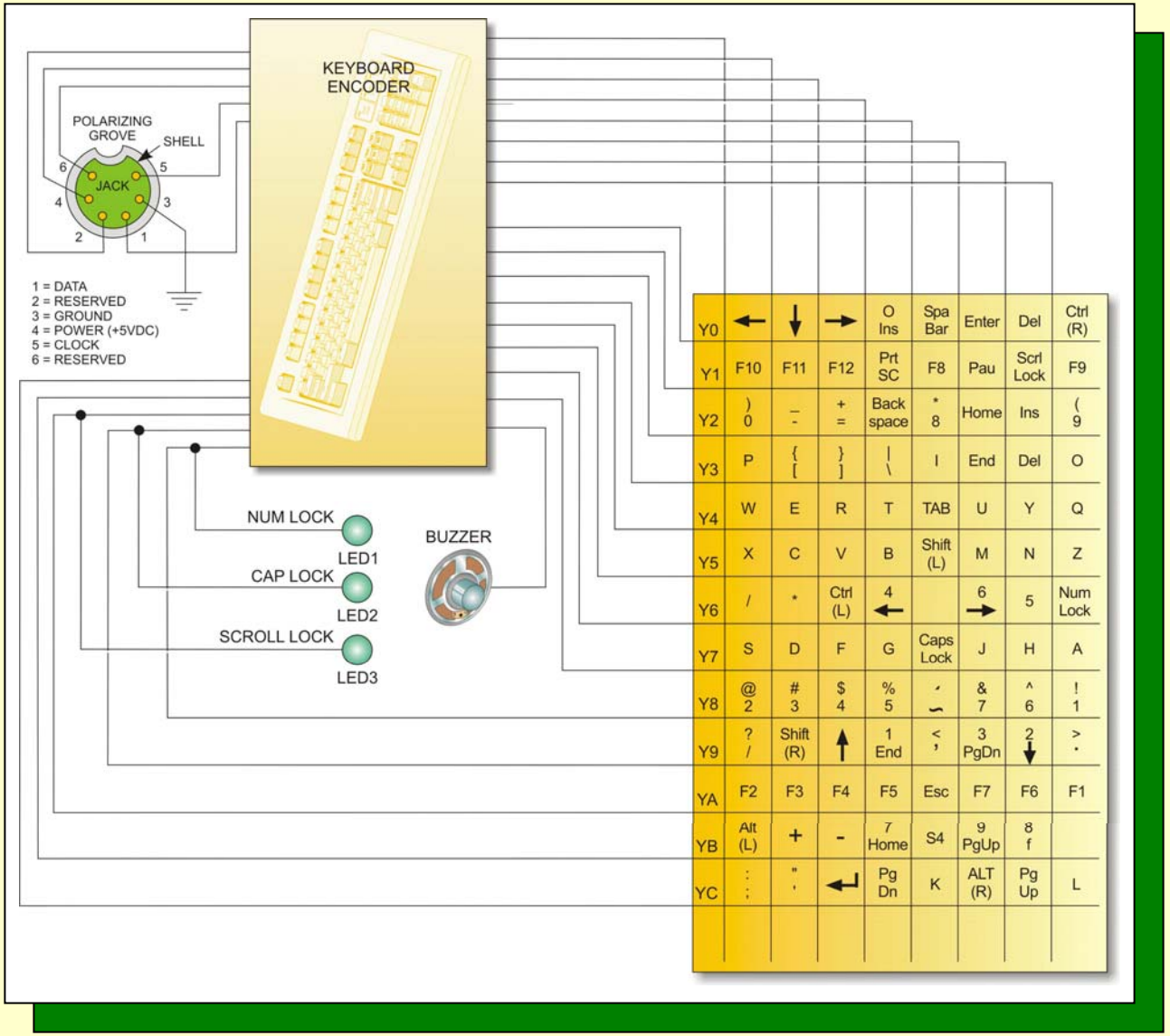
KEYBOARD ENCODER
POLARIZING GROVE
SHELL
JACK
6
5
4
3
2
1
1 = DATA
2 = RESERVED
3 = GROUND
4 = POWER (+5VDC)
5 = CLOCK
6 = RESERVED
NUM LOCK
LED1
CAP LOCK
LED2
SCROLL LOCK
LED3
BUZZER
Y0 ← ↓ → O Ins Spa Bar Enter Del Ctrl (R)
Y1 F10 F11 F12 Prt SC F8 Pau Scrl Lock F9
Y2) 0 _ - + = Back space * 8 Home Ins (9
Y3 P { [}] | \ I End Del O
Y4 W E R T TAB U Y Q
Y5 X C V B Shift (L) M N Z
Y6 / * Ctrl (L) 4 ← 6 → 5 Num Lock
Y7 S D F G Caps Lock J H A
Y8 @ 2 # 3 $ 4 % 5 ^ 6 & 7 ! 1
Y9 ? / Shift (R) ↑ 1 End < , 3 PgDn 2 ↓ > .
YA F2 F3 F4 F5 Esc F7 F6 F1
YB Alt (L) + - 7 Home S4 9 PgUp 8 f
YC : ; " ' ↵ Pg Dn K ALT (R) Pg Up L

Figure 4-30: 101-Key Keyboard

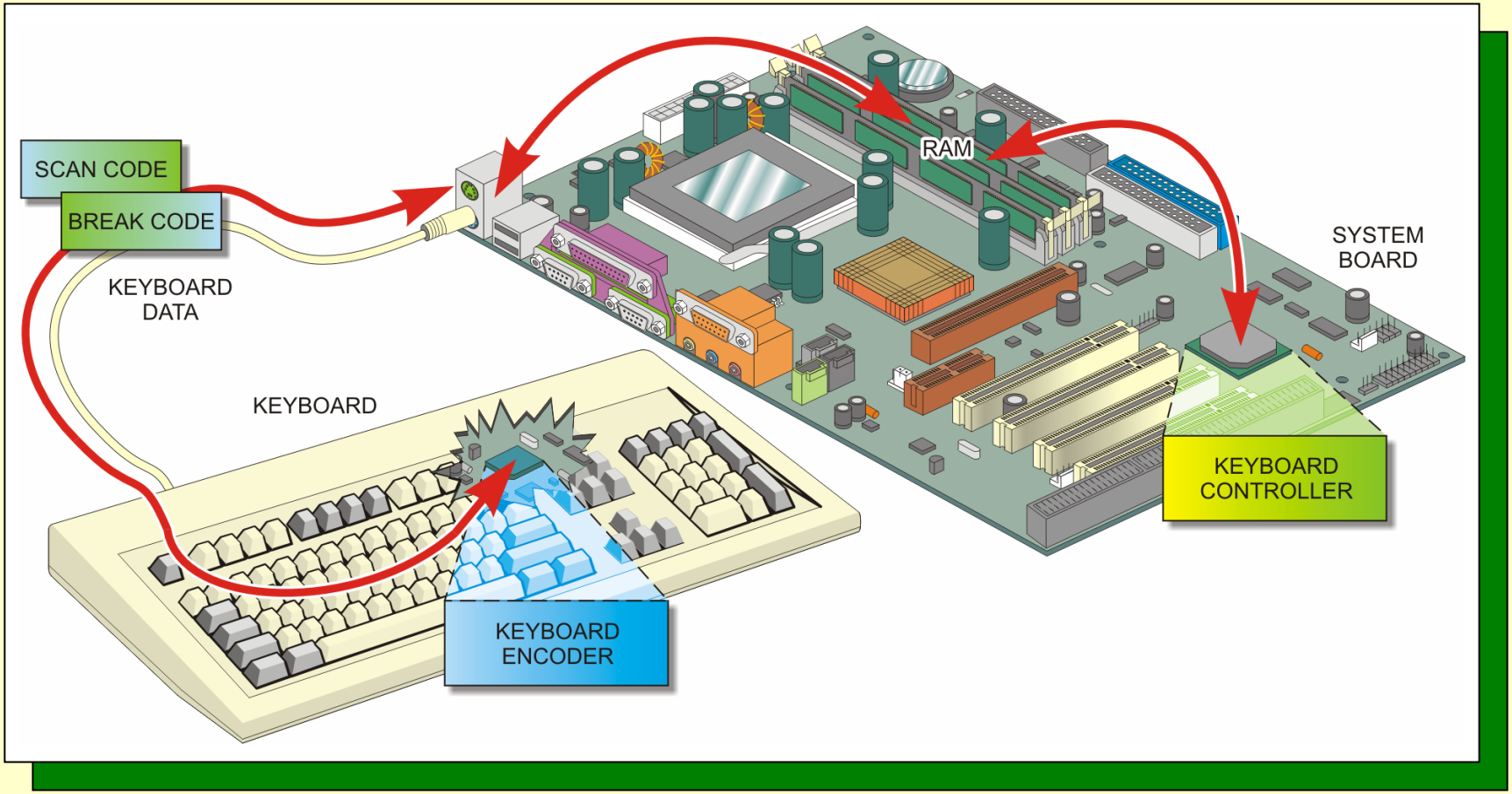

Figure 4-31: Moving Keyboard Data

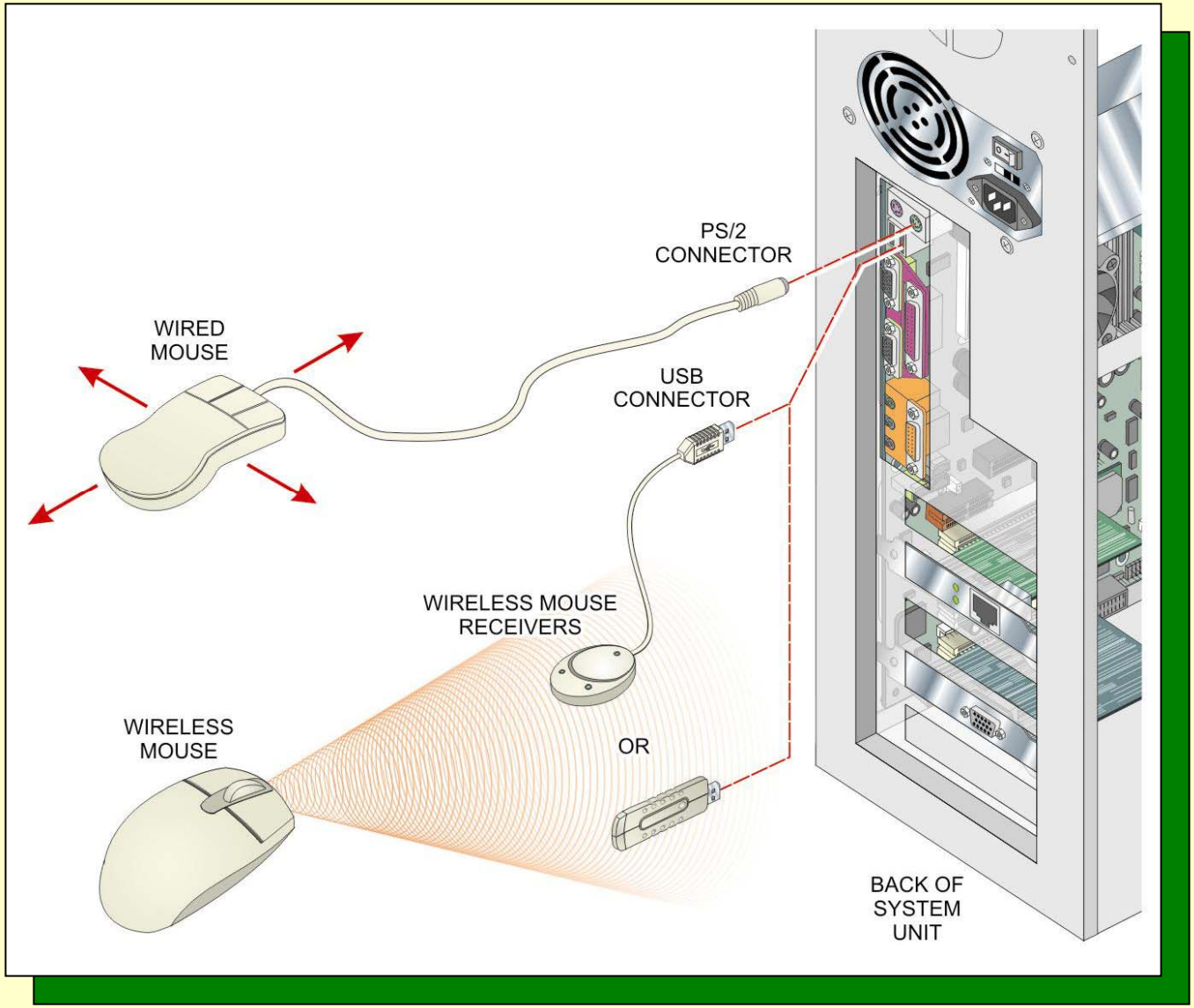

Figure 4-32: Typical Trackball Mouse

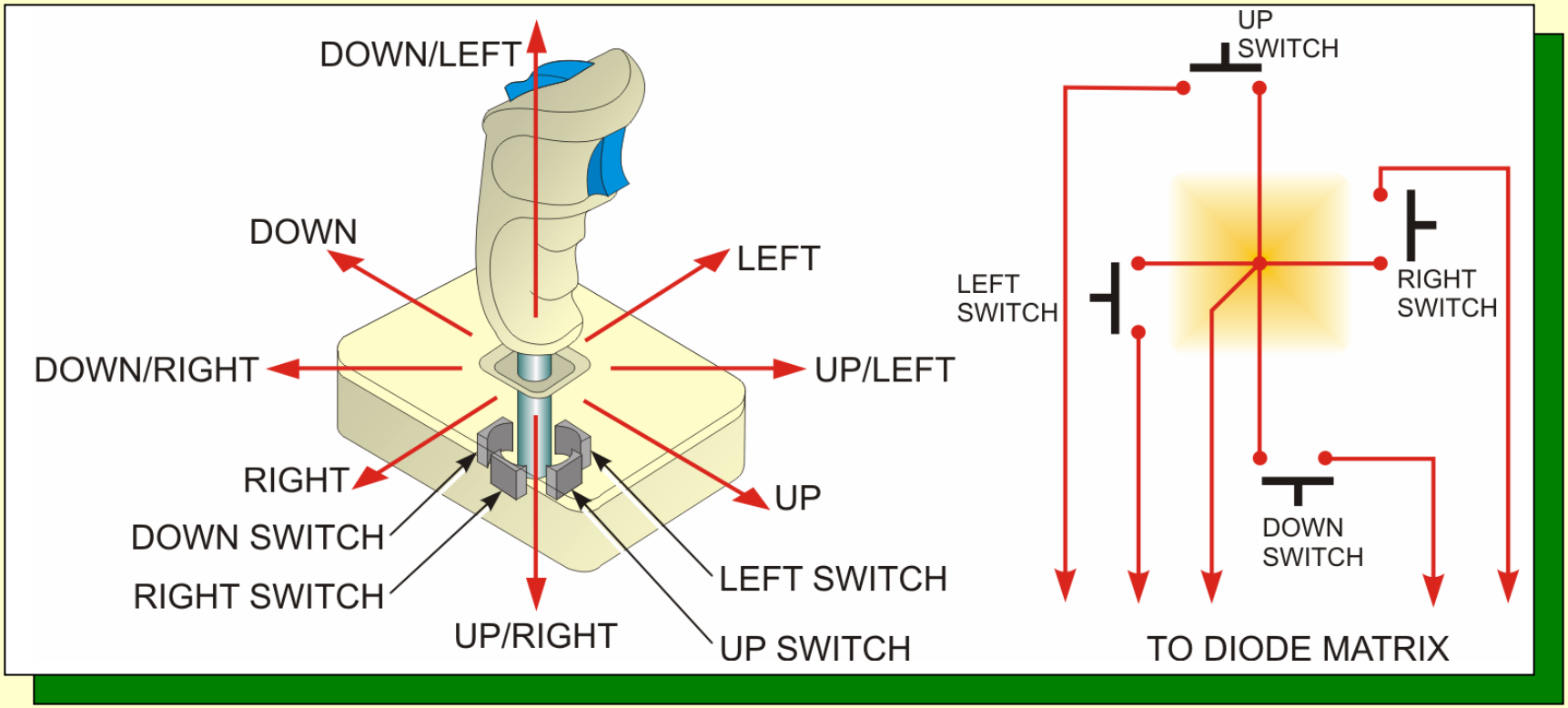

Figure 4-33: A Digital Joystick

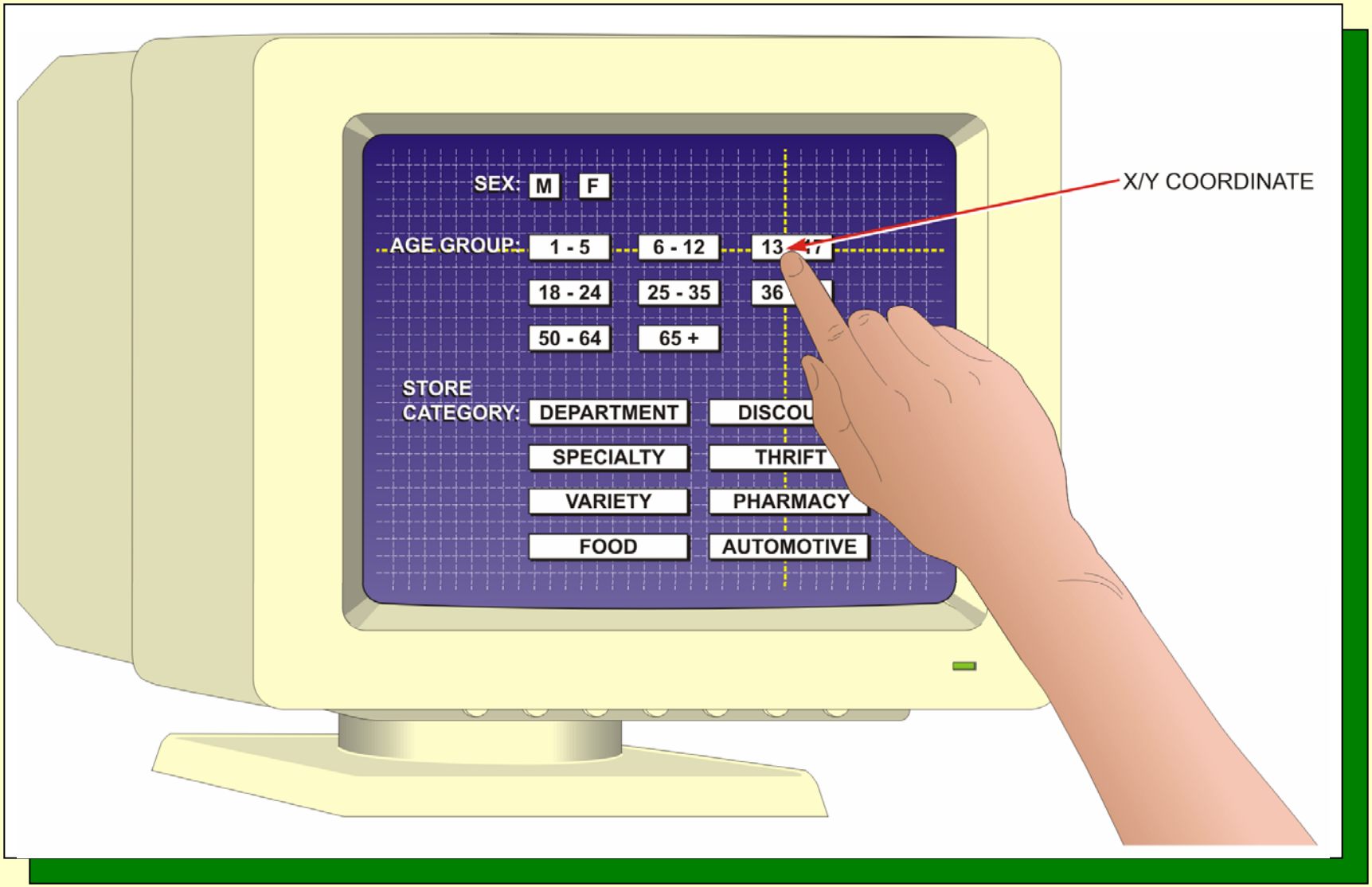
SEX: M F
AGE GROUP: 1 - 5 6 - 12 13
18 - 24 25 - 35 36
50 - 64 65 +
STORE CATEGORY: DEPARTMENT DISCOU
SPECIALTY THRIFT
VARIETY PHARMACY
FOOD AUTOMOTIVE
X/Y COORDINATE

Figure 4-34: Membrane Strip Touch Screen

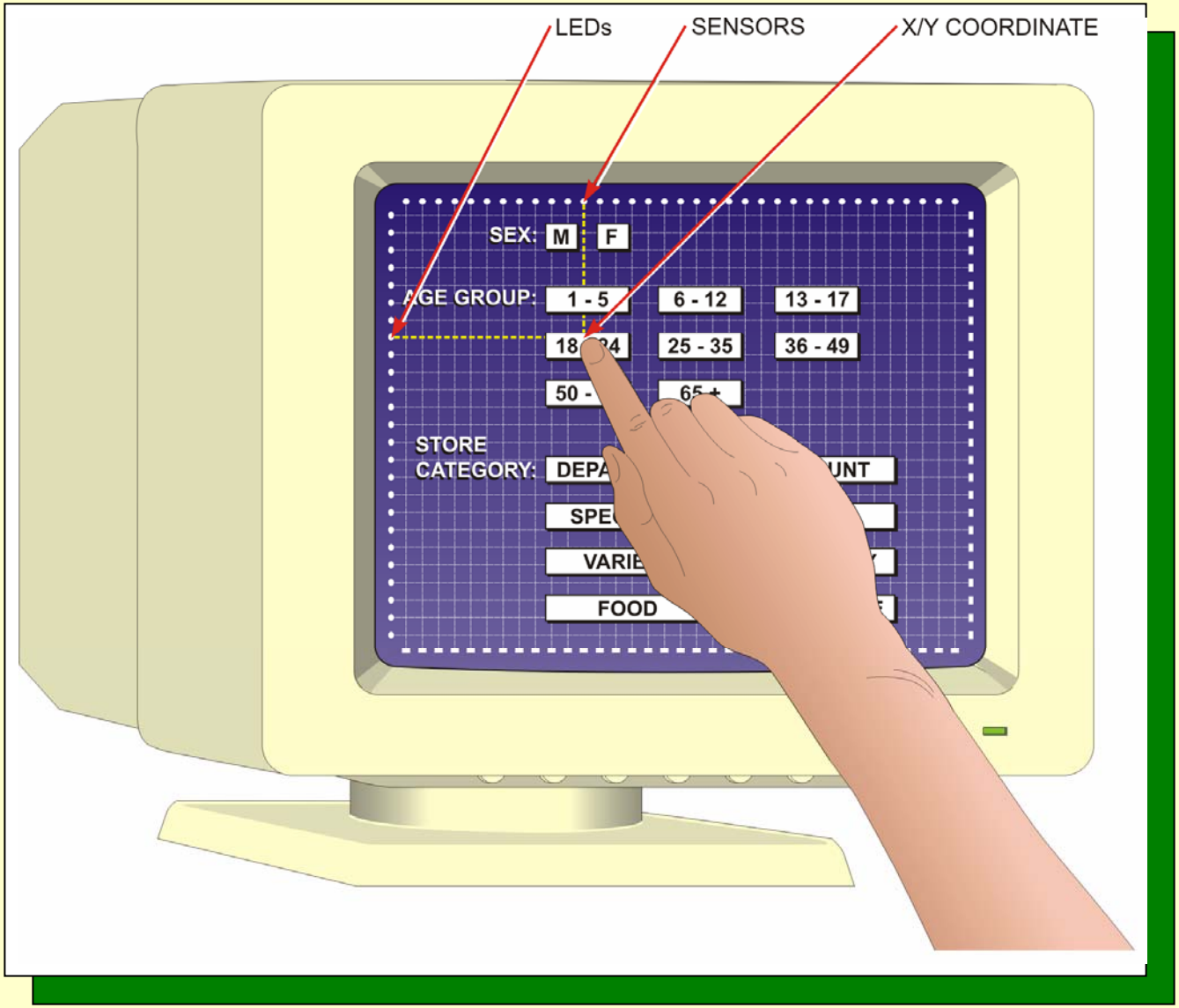

Figure 4-35: LED Sensor Touch Screen

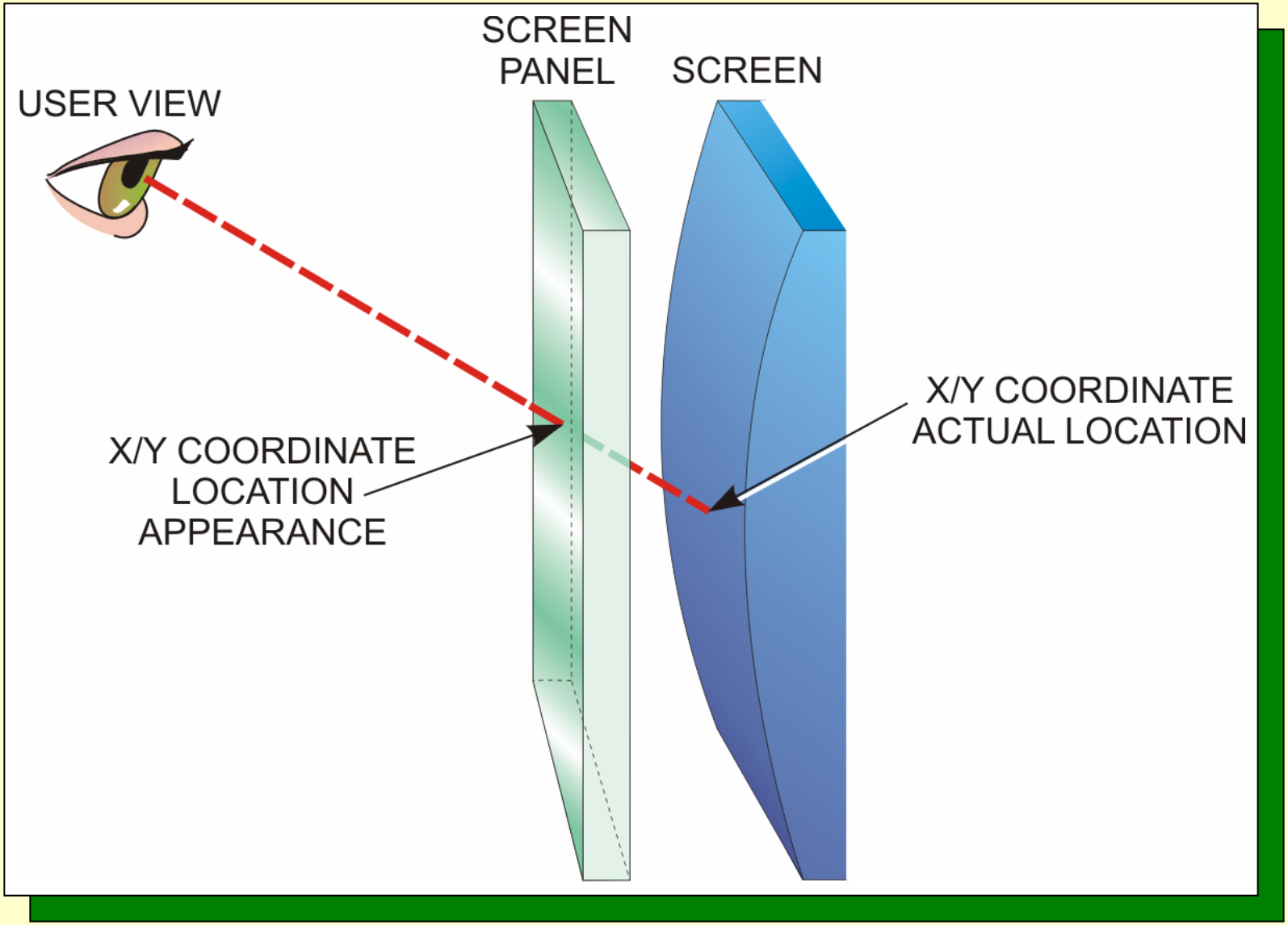

Figure 4-36: Parallax Error

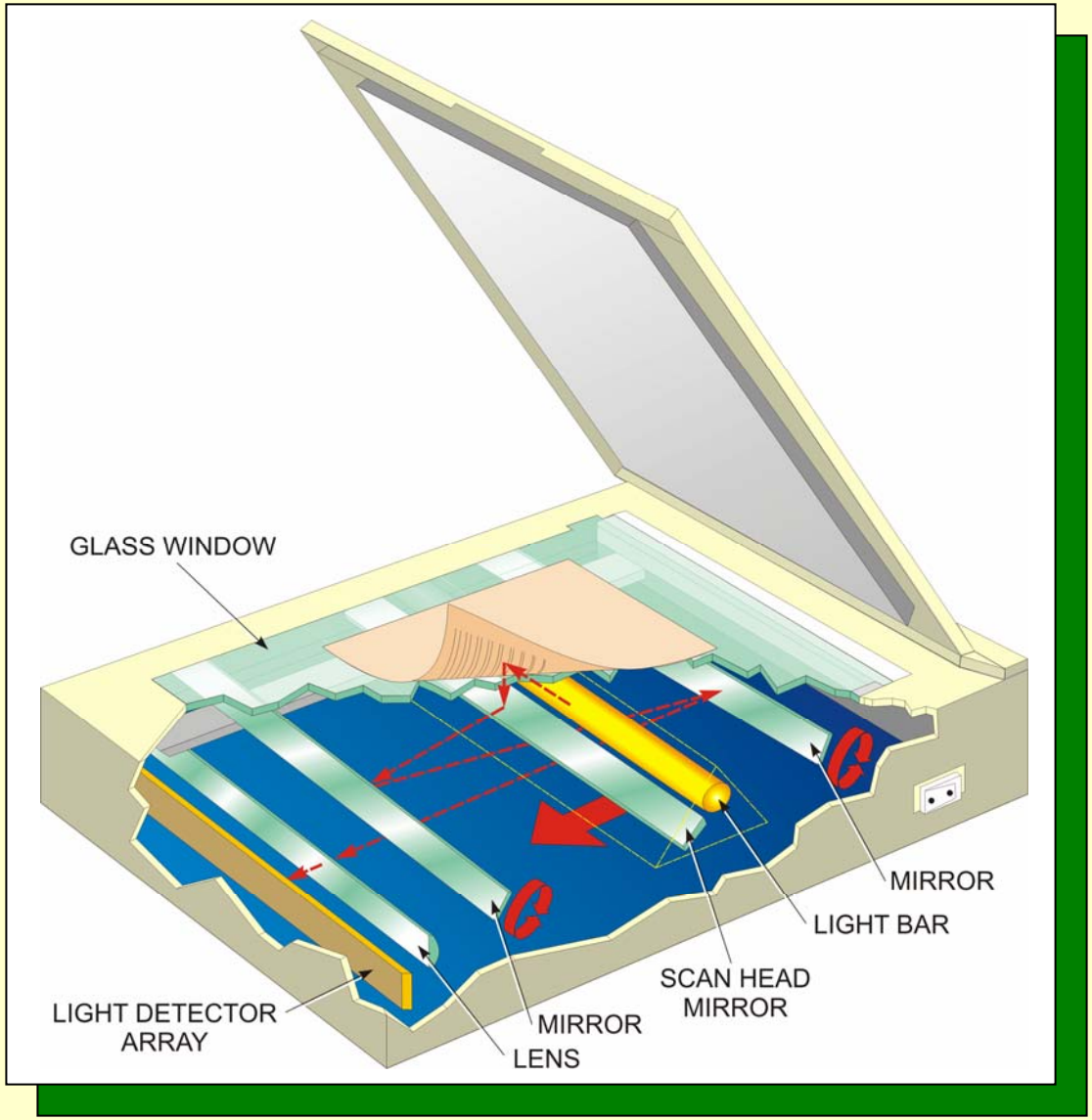

Figure 4-37: A Flatbed Scanner

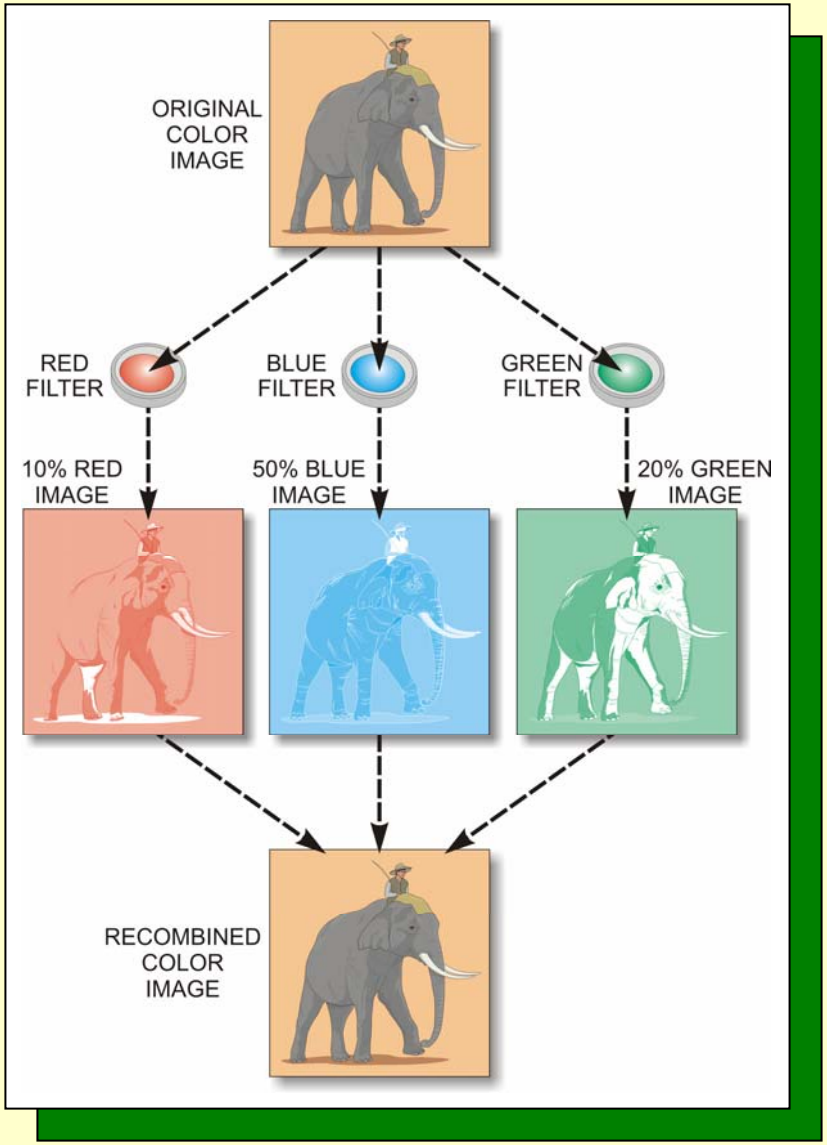

Figure 4-38: Color Filters

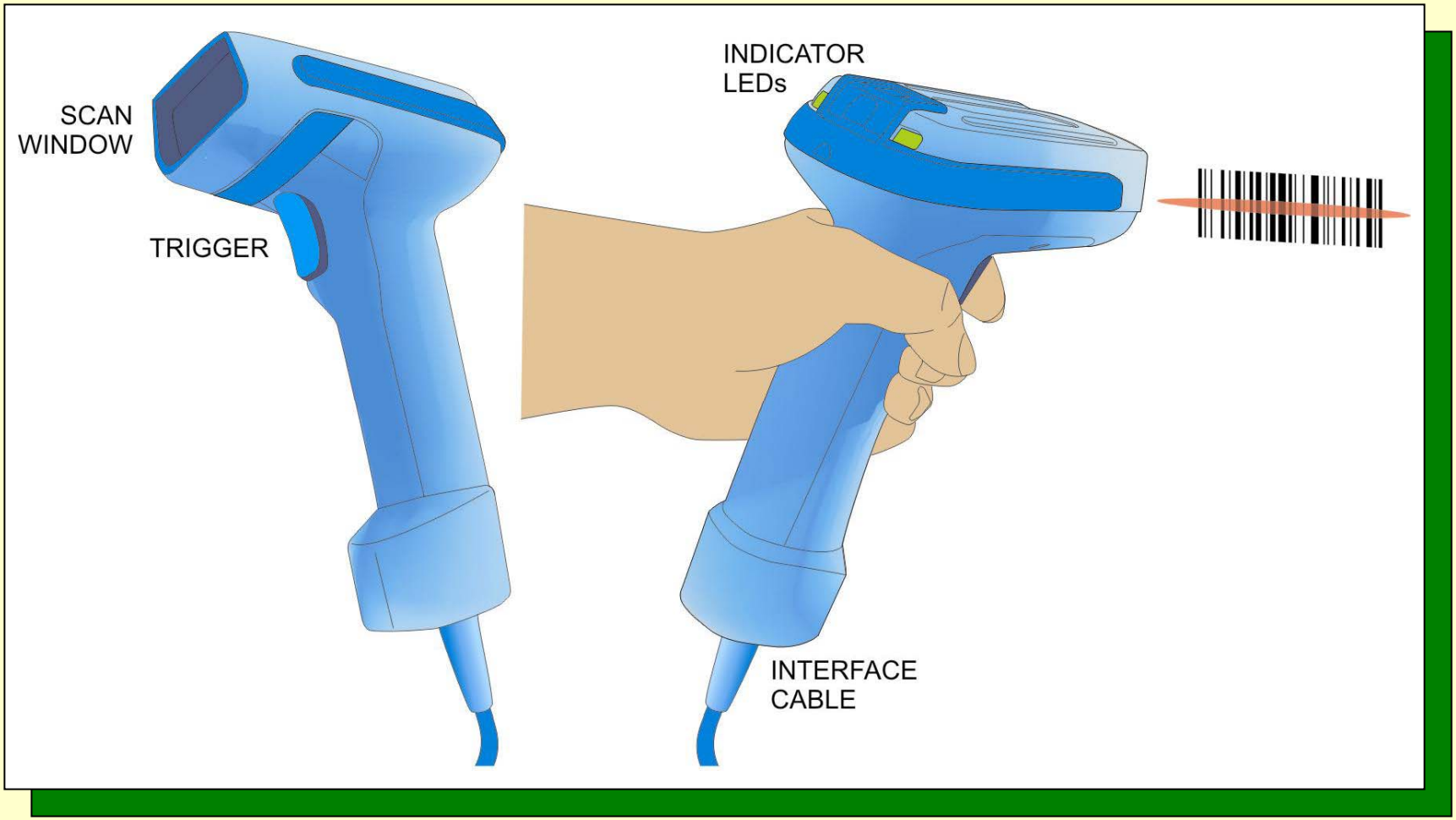

Figure 4-39: A Handheld Bar Code Scanner

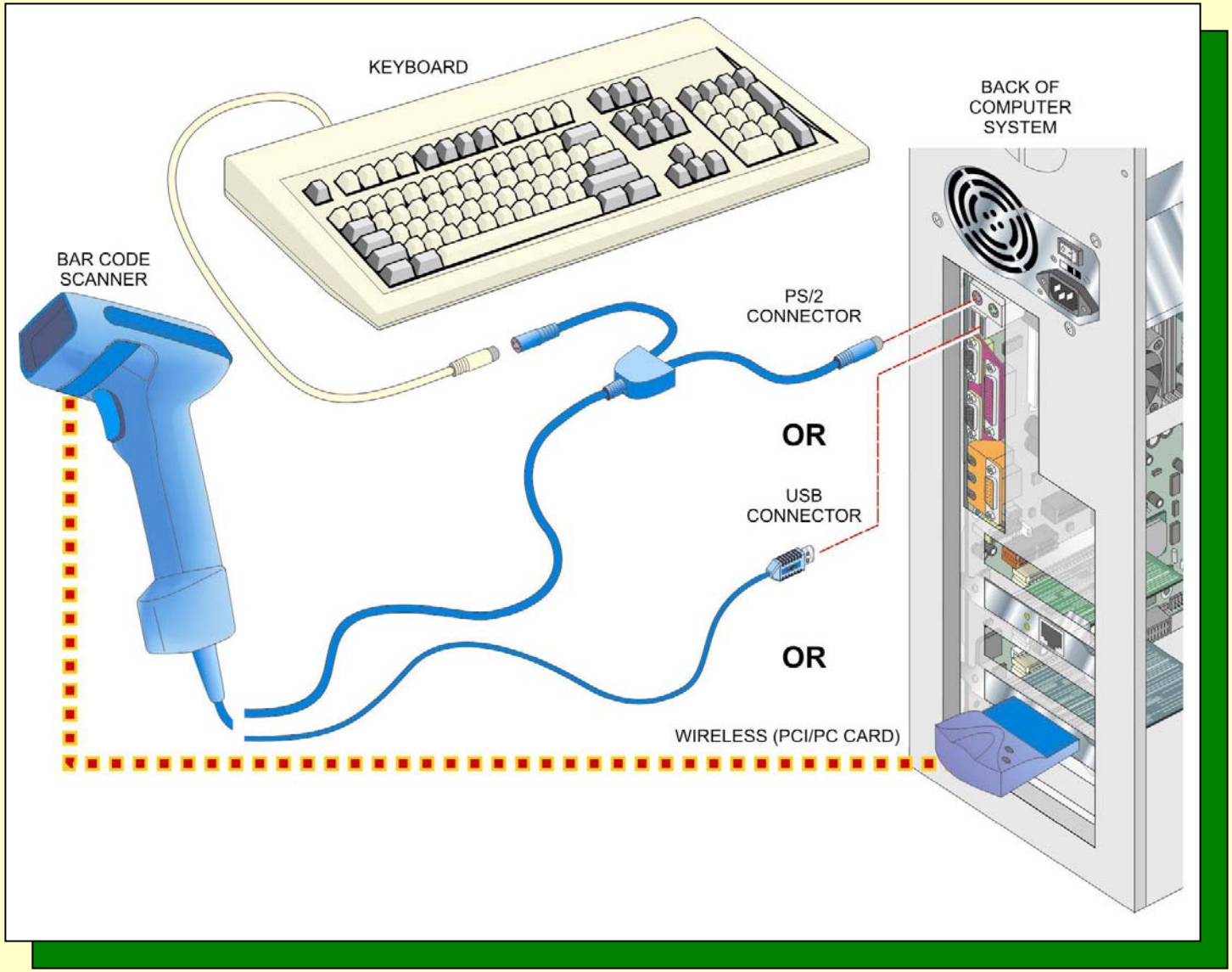

Figure 4-40: Connecting a Bar Code Scanner

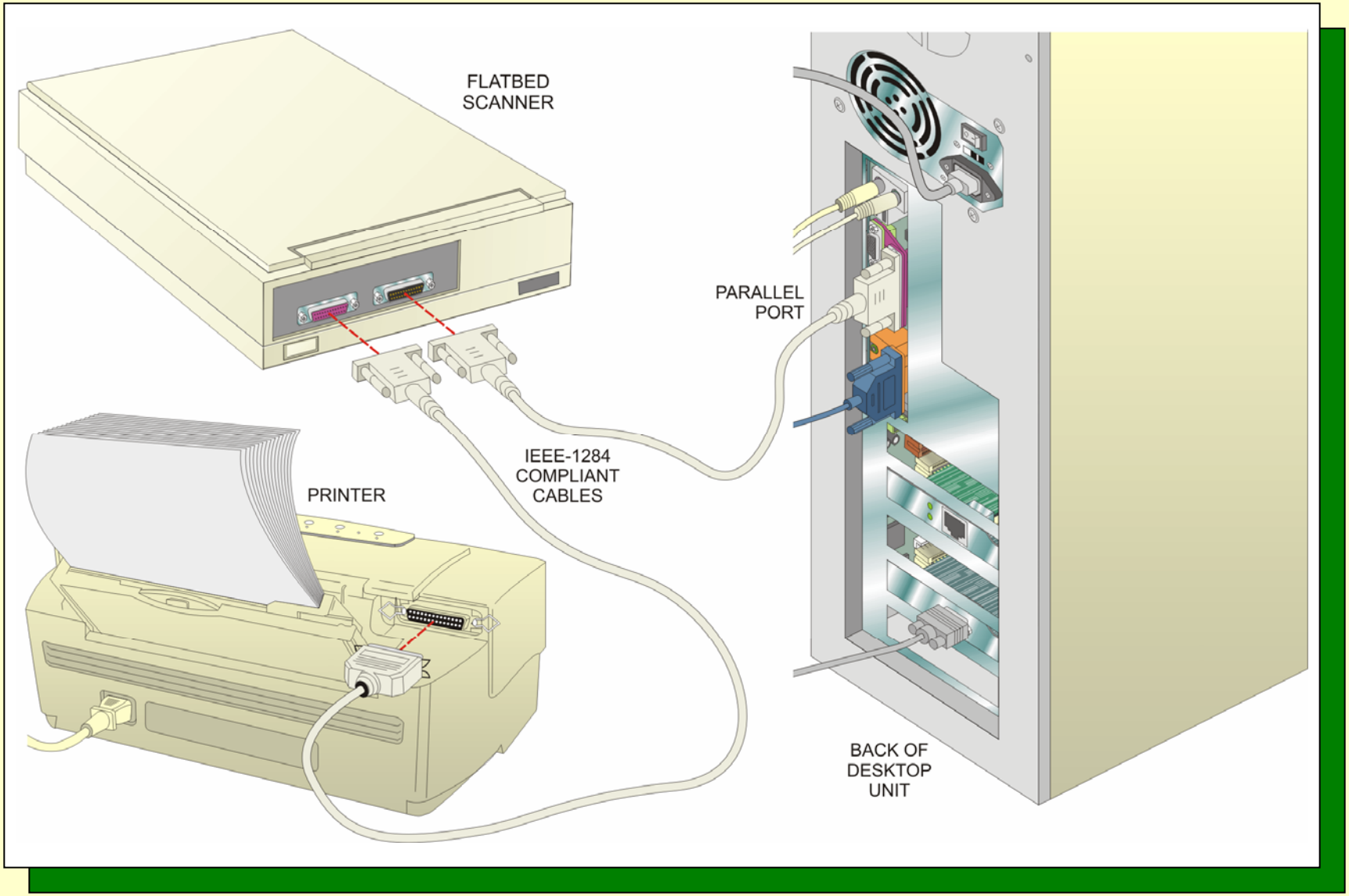

Figure 4-41: Connecting an IEEE-1284-Compliant Scanner

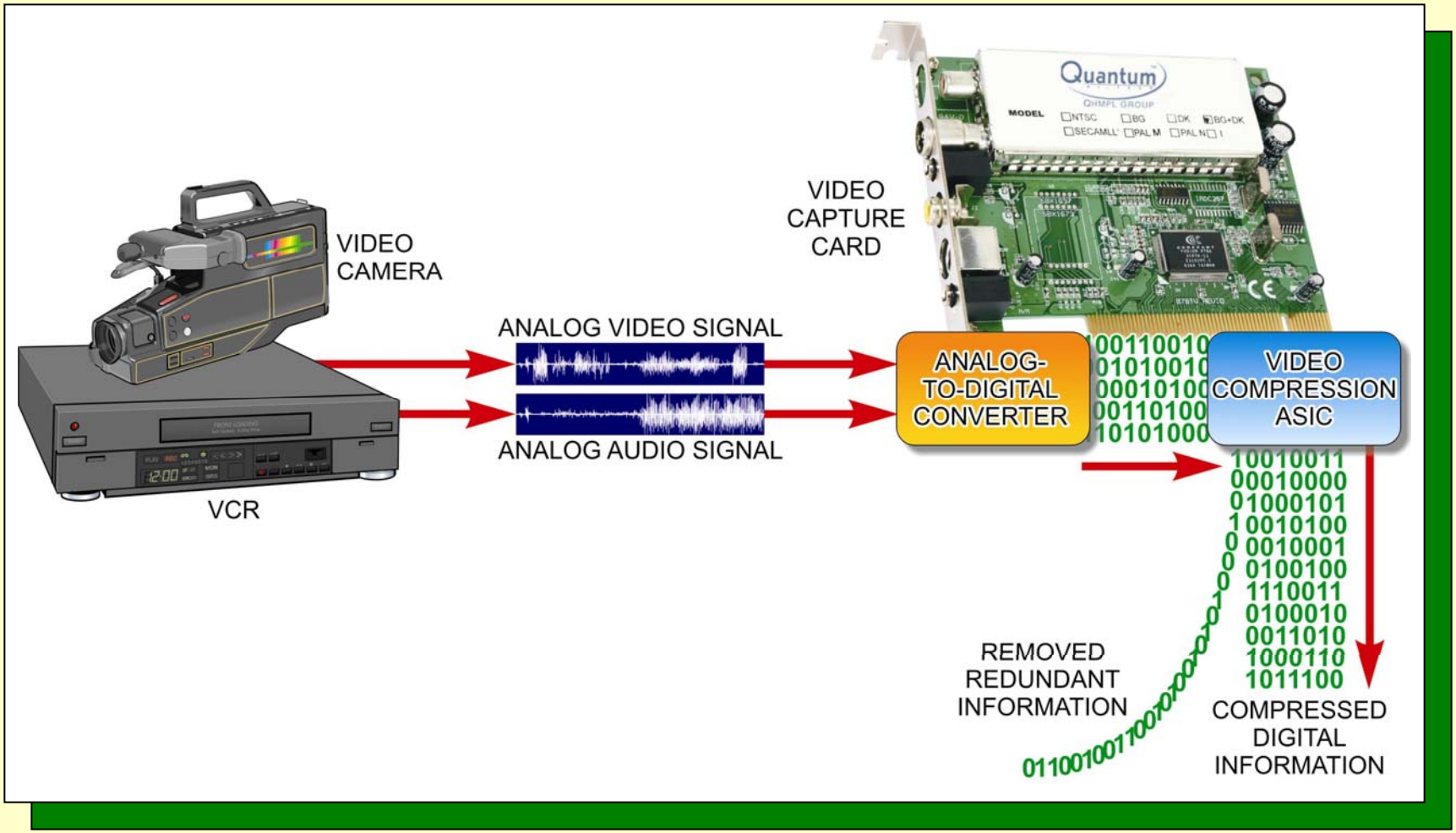

Figure 4-42: Video Capture Operations

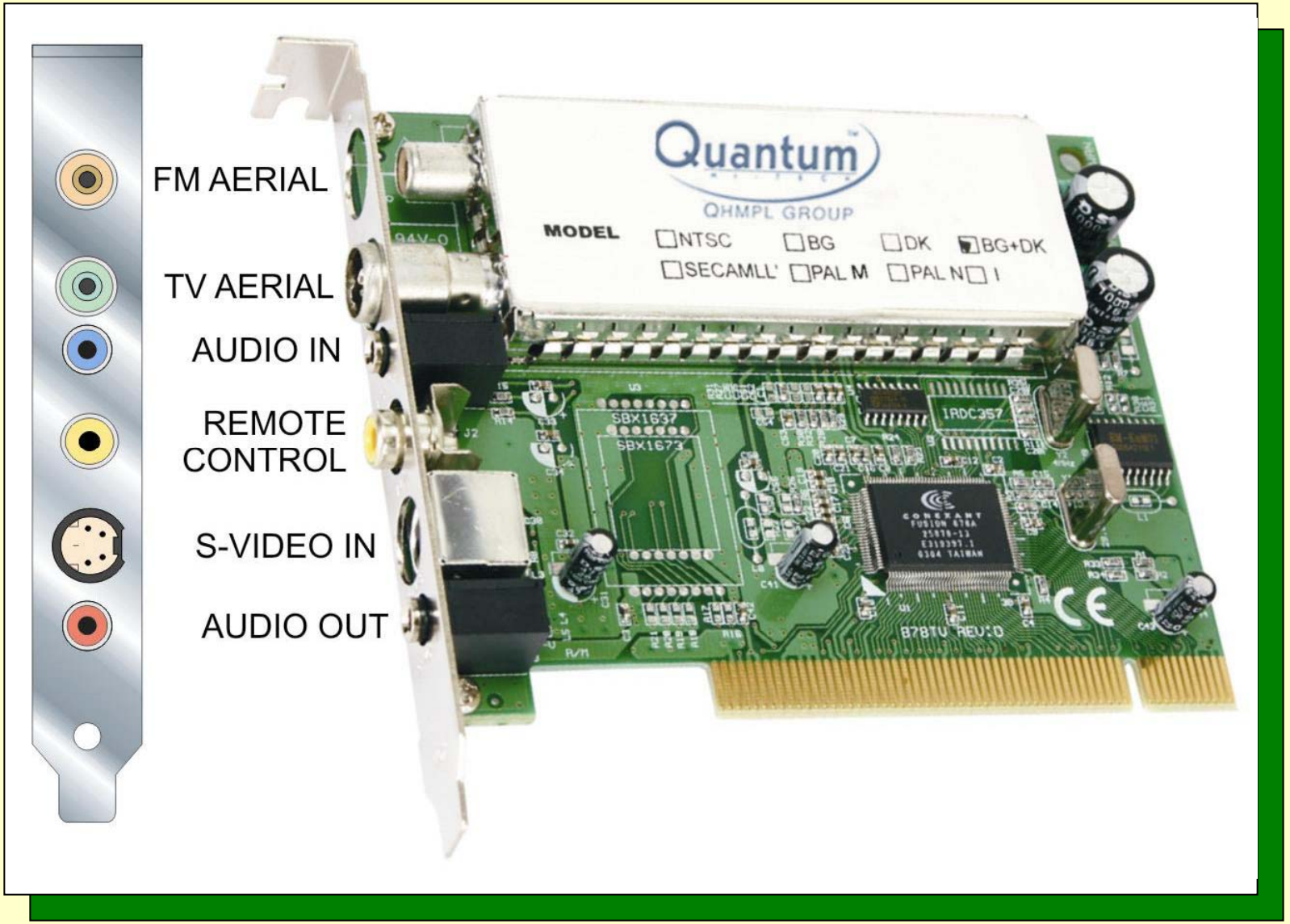

Figure 4-43: Video Capture Connections

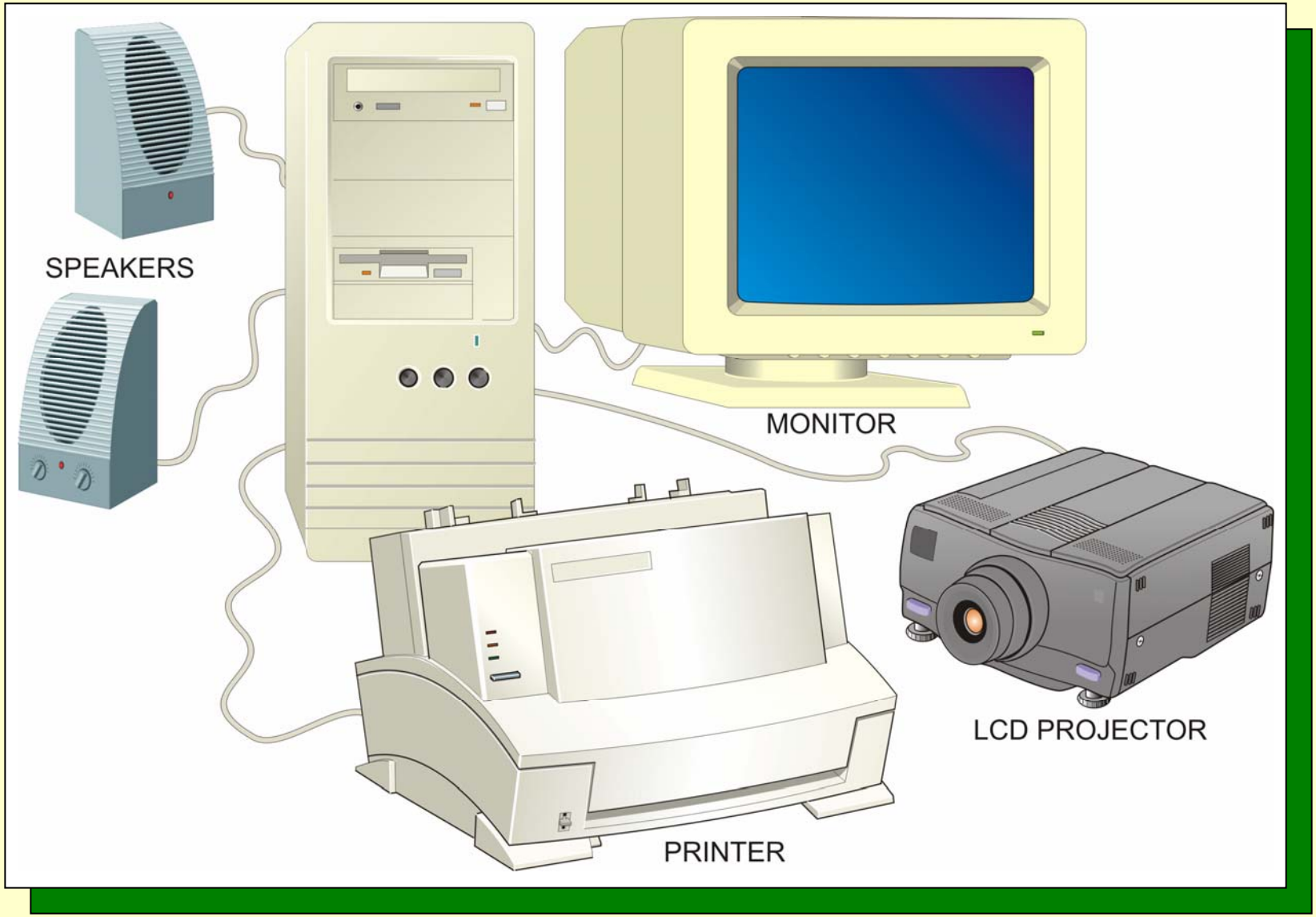

Figure 4-44: Typical Output Devices

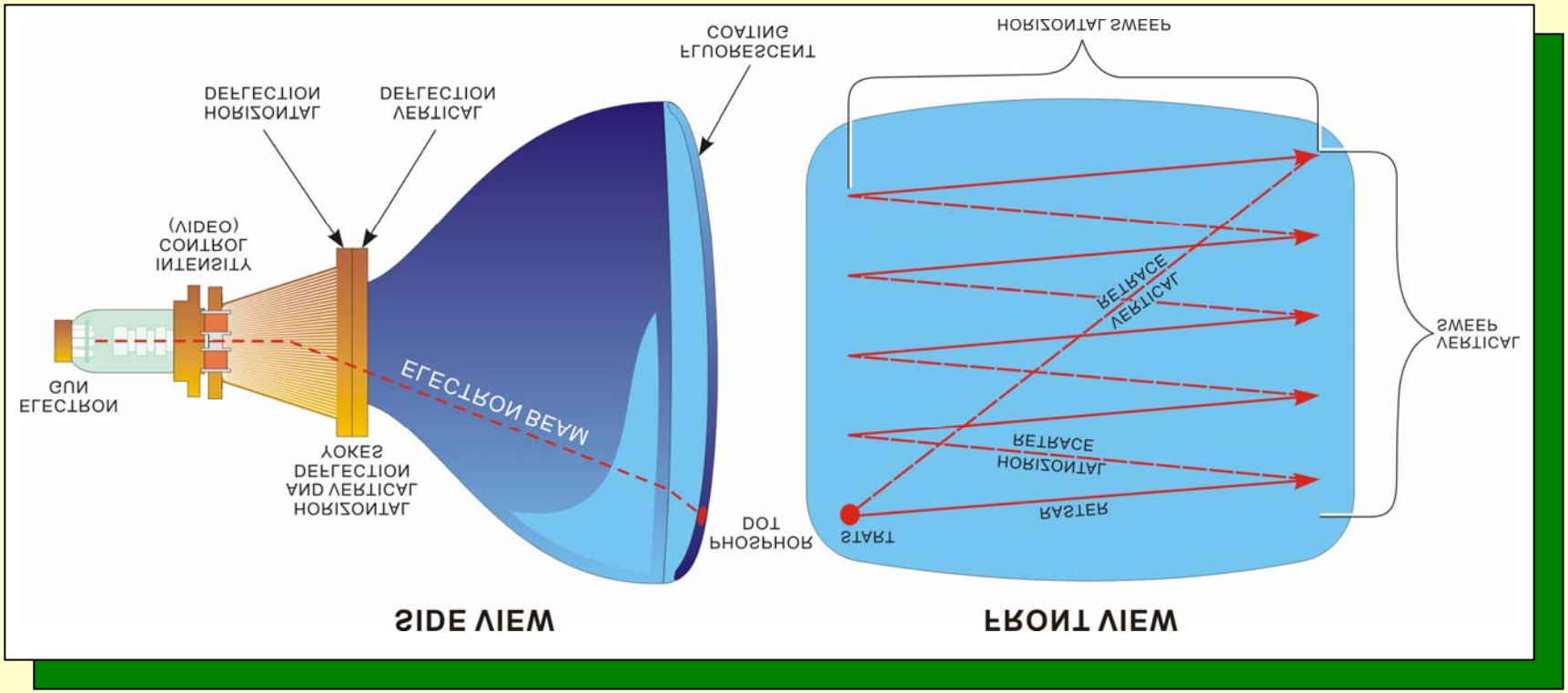

Figure 4-45: A Cathode-Ray Tube

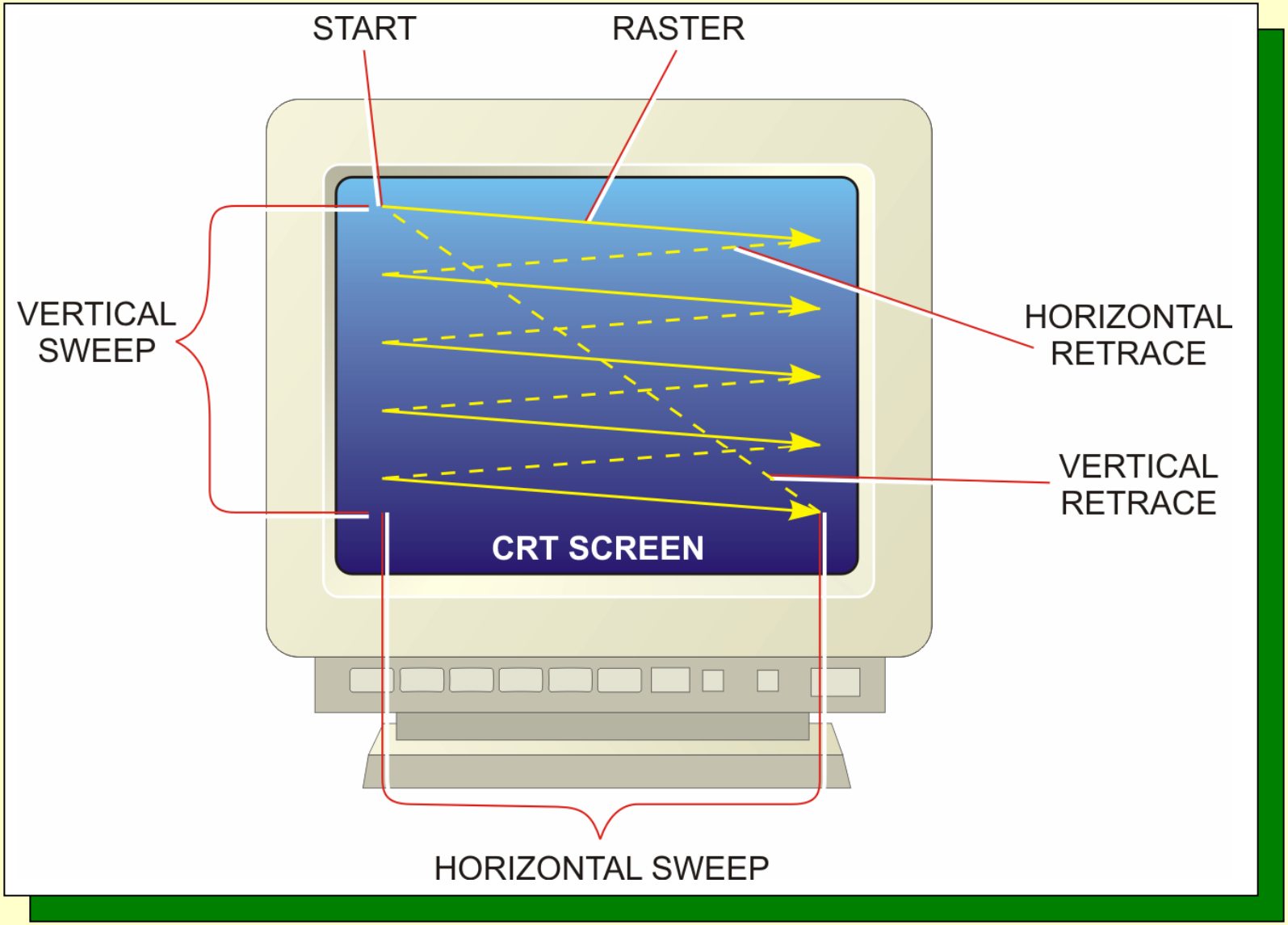

Figure 4-46 Raster Scan Video

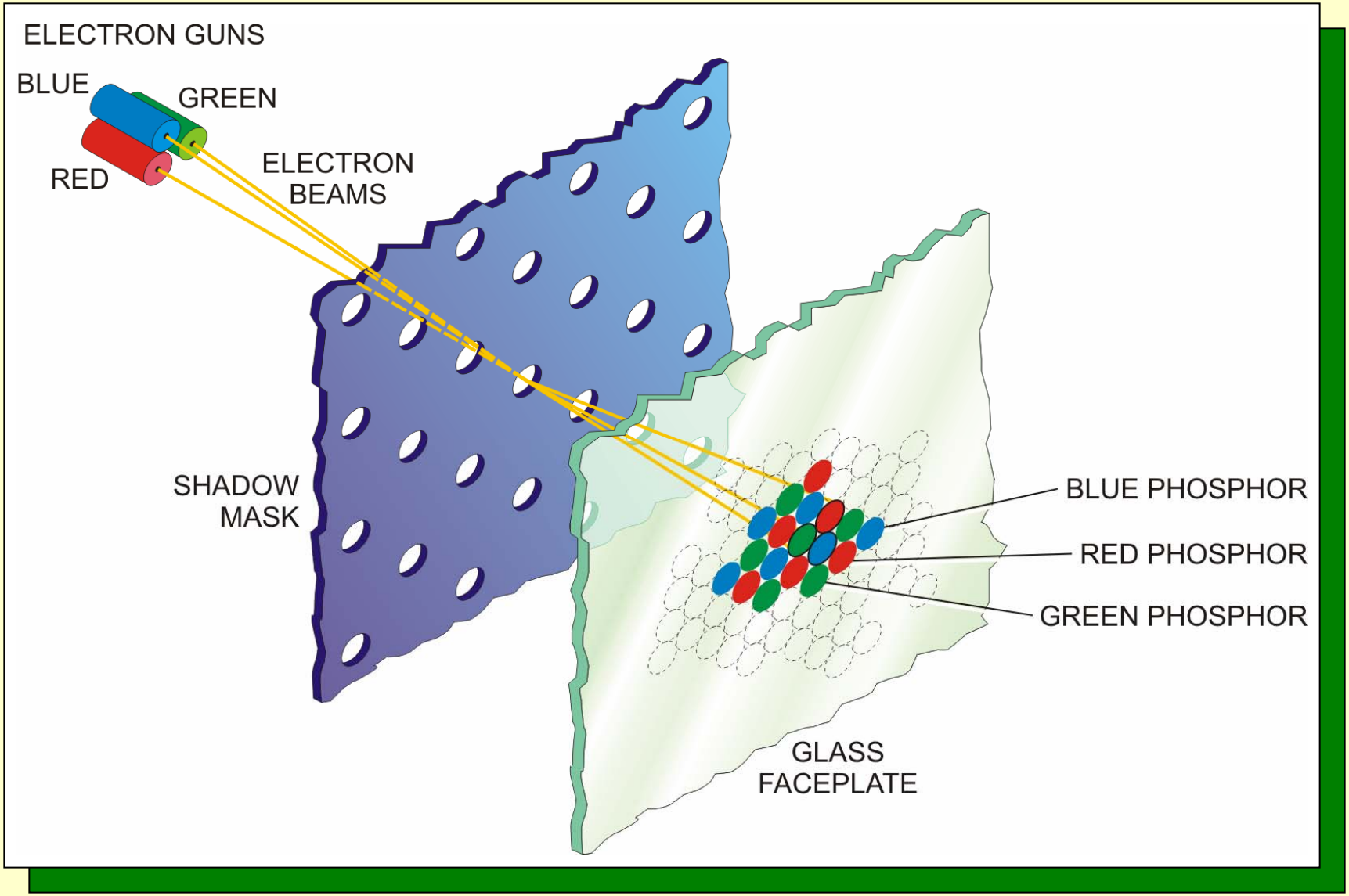

Figure 4-47: A Color CRT Construction

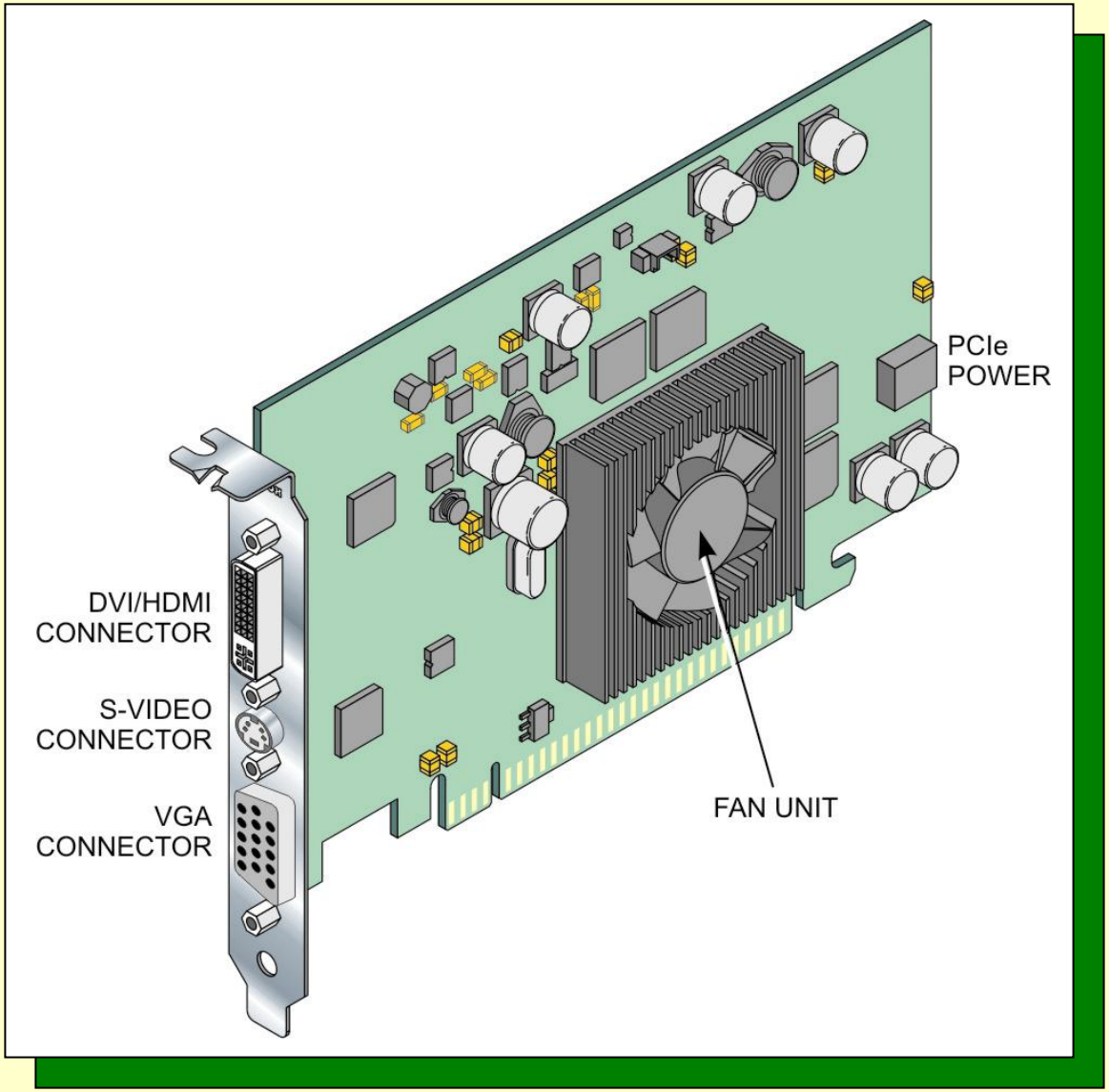

Figure 4-48: An Advanced Video Card

Several newer XGA standards have made it to the market. These include:

- **Super XGA (SXGA) specification capable of displaying 1280 × 1024 resolution**
- **Ultra XGA (UXGA) specification capable of displaying 1600 × 1200 resolution**
- **Wide UXGA (WUXGA) specification that is capable of displaying 1920 × 1200 resolution**

Table 4-7: Video Standards

STANDARD	RESOLUTION (HXV PIXELS)	A/N DISPLAY	A/N CHARACTER	REFRESH RATE	HORIZONTAL SWEEP RATE	BUFFER ADDRESS
MDA (Monochrome Display Adapter)	720 x 348 720 x 348	80 x 25	7 x 9 in 9 x 14	50/60	Non-interlaced	B0000–B7FFF B0000–B7FFF B0000–BFFFF
CGA (Color Graphics Adapter)	640 x 200 160 x 100 320 x 200 640 x 200	80 x 25	7 x 7 in 8 x 8	60	15 kHz	B8000–BBFFF
HGA (Hercules Graphics Adapter)	720 x 348	80 x 25	7 x 9 in 9 x 14	50	18.1 kHz	B0000–BFFFF
EGA (Extended Graphics Adapter)	640 x 350 640 x 350	80 x 25 80 x 43	7 x 9 in 8 x 14	60 Hz	22.1 kHz	0A0000
VGA (Video Graphics Array Adapter)	720 x 400 640 x 480	80 x 25 80 x 43	9 x 16	60 or 70 Hz	31.5 kHz	0A0000–0BFFFF
Super VGA (SVGA)	1280 x 1024 1024 x 768 800 x 600	80 x 25 80 x 43	9 x 16	50, 60, or 72	35-48 kHz	0A0000–0BFFFF
XGA	1024 x 768 800 x 600	132 x 25	9 x 16 8 x 16	44/70	35.5 kHz	0A0000–0BFFFF
Super XGA (SXGA)	1280 x 1024	-	-	60/70/72/75/80/100 Hz	24.8–82 kHz (analog) 65 kHz (digital)	0A0000–0BFFFF
Ultra XGA (UXGA)	1600 x 1200	-	-	60/70/72/75/80/100 Hz	21–100 kHz (analog) 31–100 kHz (digital)	0A0000–0BFFFF
Wide UXGA (WUXGA)	1920 x 1200	-	-	60/70/72/75/80/100 Hz	24–100 kHz (analog) 31–100 kHz (digital)	0A0000–0BFFFF

TEST TIP

Be able to explain the definition of dot pitch.

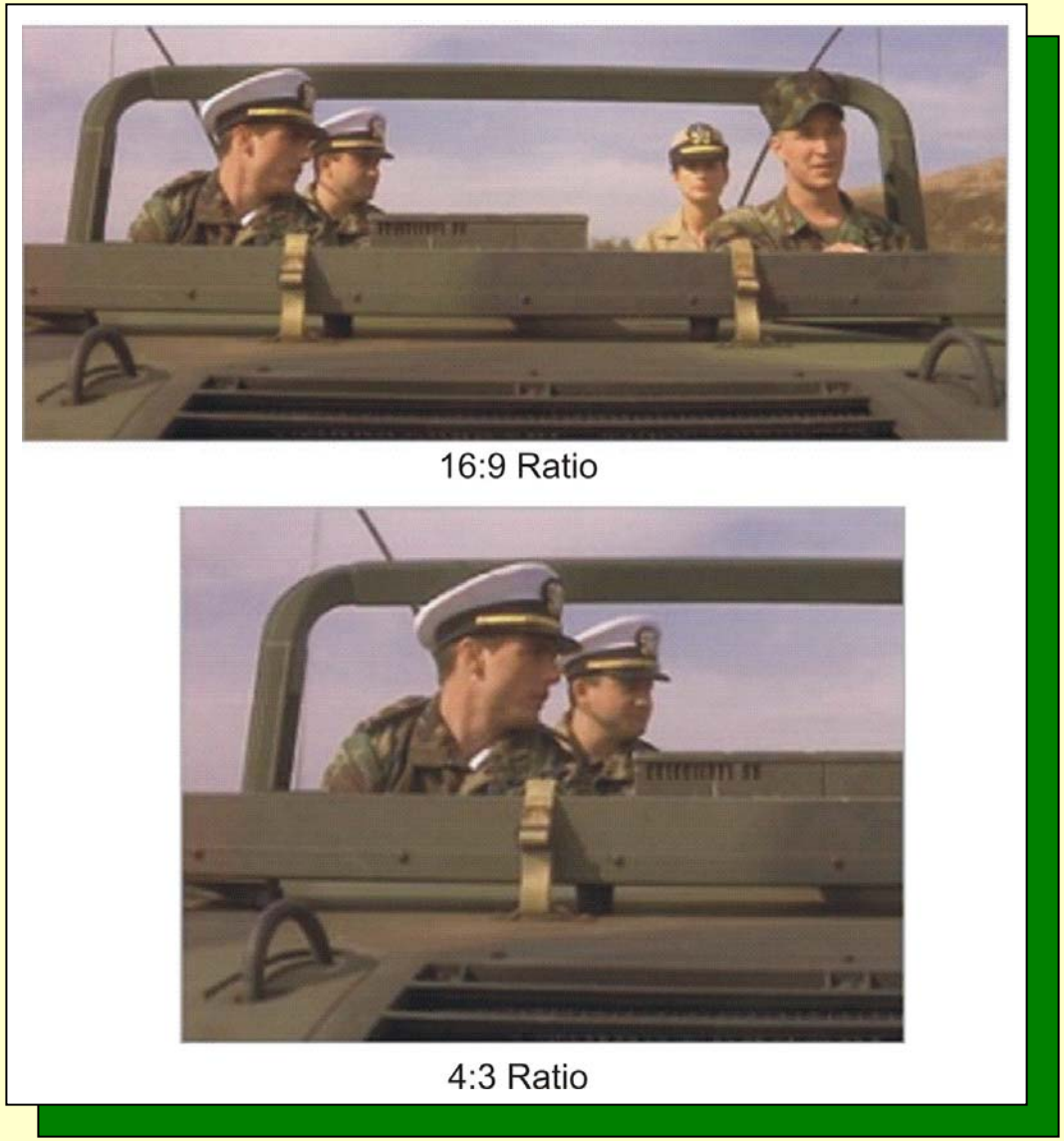

Figure 4-49: Aspect Ratio Affects

The new digital television display standards have also caused a reevaluation of display-related terms.

- **Low-Definition TV (LDTV) - Display systems that produce lower resolutions than the NTSC standard. These systems are digital and provide video for Internet distribution, where higher bandwidth video streams associated with higher-resolution video streams would slow down or crash the system. Typical resolutions associated with LDTV are 240p and 288p. Screen refresh rates used with LDTV include 24, 30, and 25 Hz. LDTV is used with Apple iPods, Sony Playstations, and video CDs.**

(continued)

The new digital television display standards have also caused a reevaluation of display-related terms. (continued)

- **Standard-Definition TV (SDTV) - Digital display systems that have lower resolutions than the high-definition TV specification calls for. These include the standard digital television displaying NTSC broadcasts. SDTV resolutions include 480i for displaying NTSC programming and 480p for European PAL-M programming. SDTV screen refresh rates are 60, 24, and 30 Hz. For PAL and SECAM formats, the resolutions are 576i and 576p using 50 and 25 Hz refresh rates.**

(continued)

The new digital television display standards have also caused a reevaluation of display-related terms. (continued)

- **Enhanced-Definition TV (EDTV) - A gray area of picture quality that falls between traditional NTSC/PAL picture quality and the definitions set for HDTV images. DVD players with progressive scan output are a good example of EDTV. The EDTV image has a horizontal resolution of 704 pixels regardless of the aspect ratio - the picture is stretched to fit 4:3 or 16:9 aspect ratios.**

(continued)

The new digital television display standards have also caused a reevaluation of display-related terms. (continued)

- **High-Definition TV (HDTV) - Under the ATSC standard, HDTV is any image being displayed at a resolution of 720 or more using a 16:9 aspect ratio. Cinematic video is produced in 720p or 1080p formats using a 24 frame per second refresh rate. Noncinematic HDTV images are produced in 720p or 1080i formats with refresh rates of 24, 25, 30, 50 or 60 Hz, depending on the producer of the content. In computer terms, these are screen resolutions of 1280 × 1024 and 1920 × 1080, respectively.**

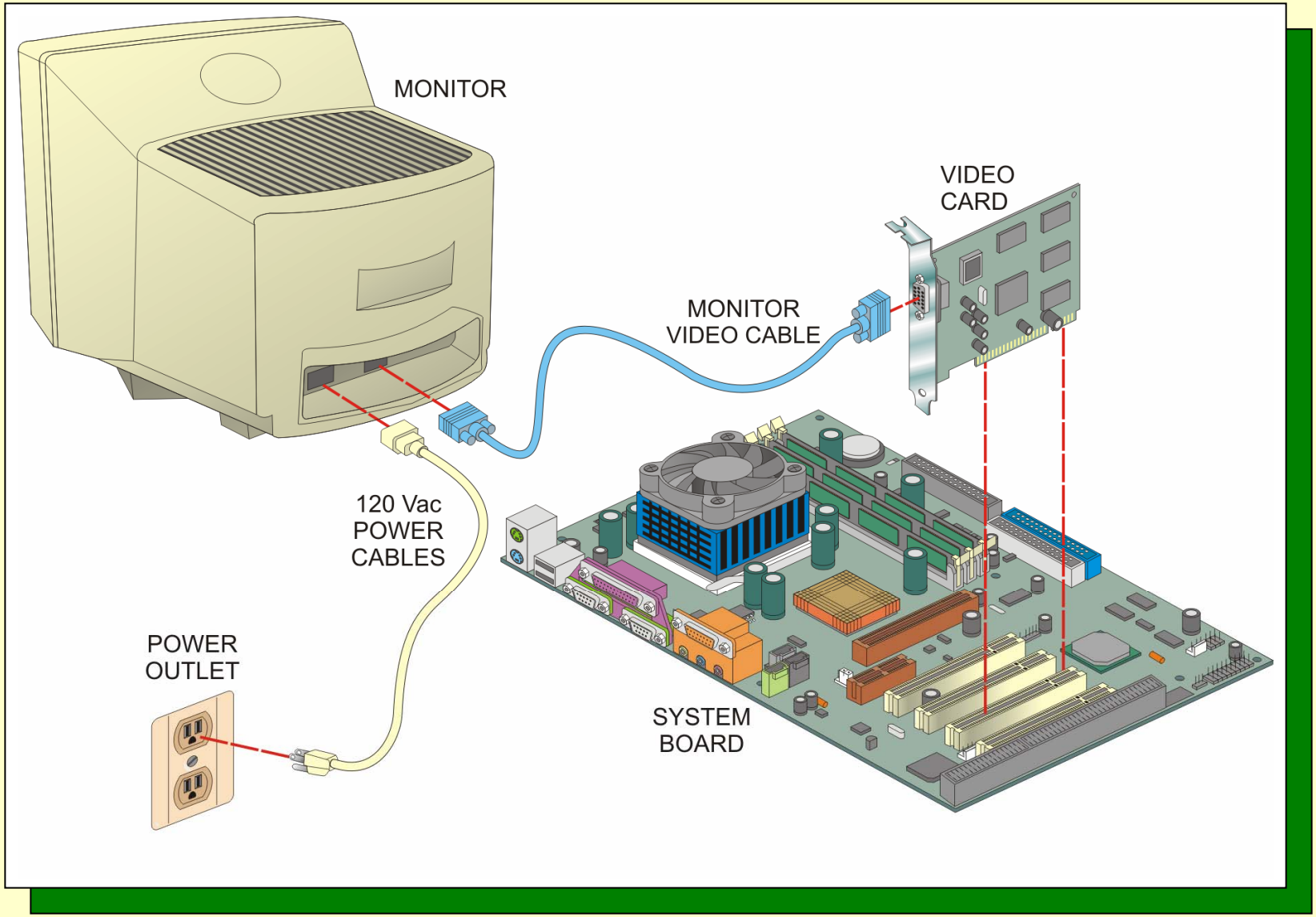

Figure 4-50: Video System Components

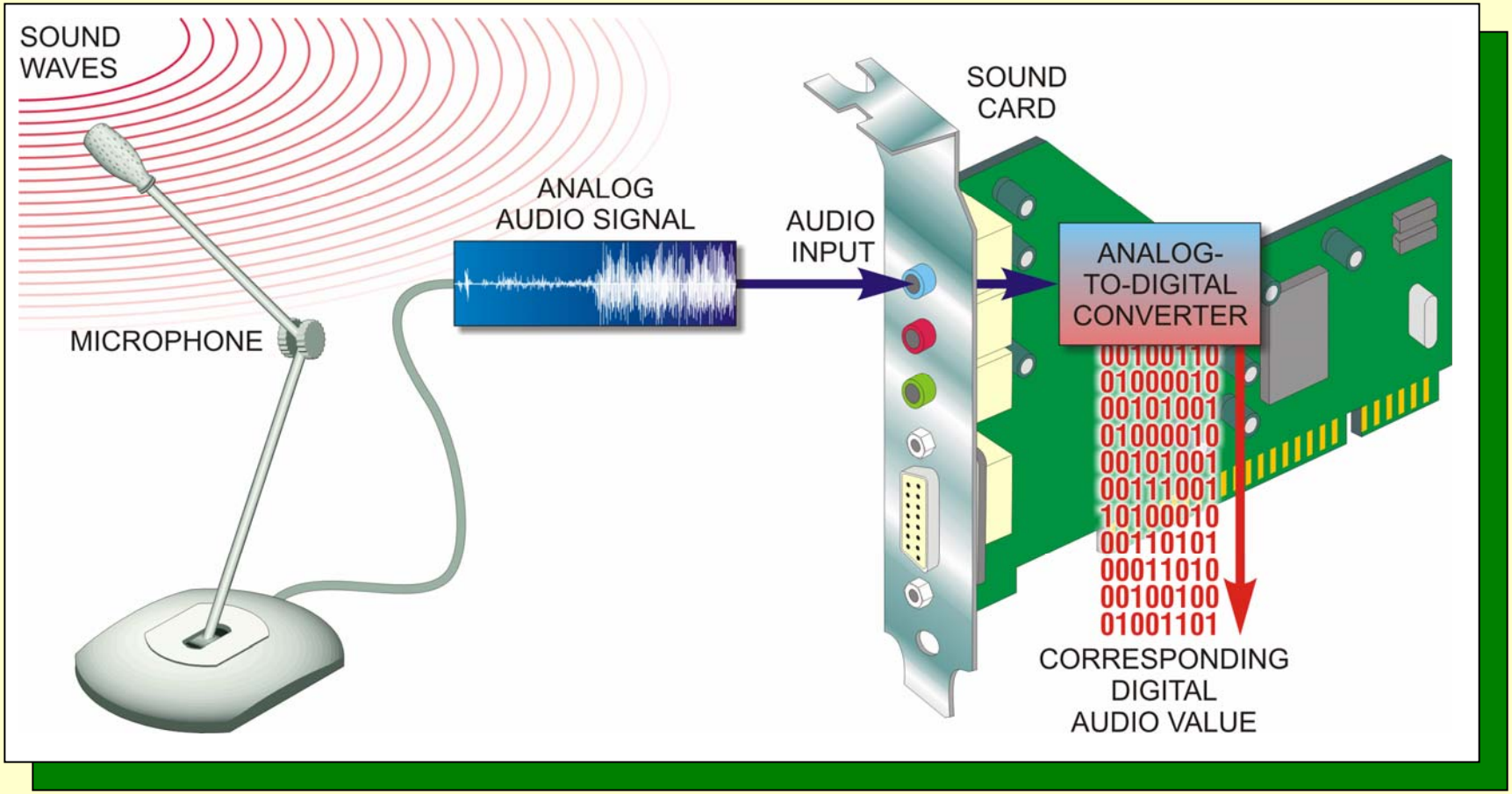

Figure 4-51: A Typical Audio Digitizer System

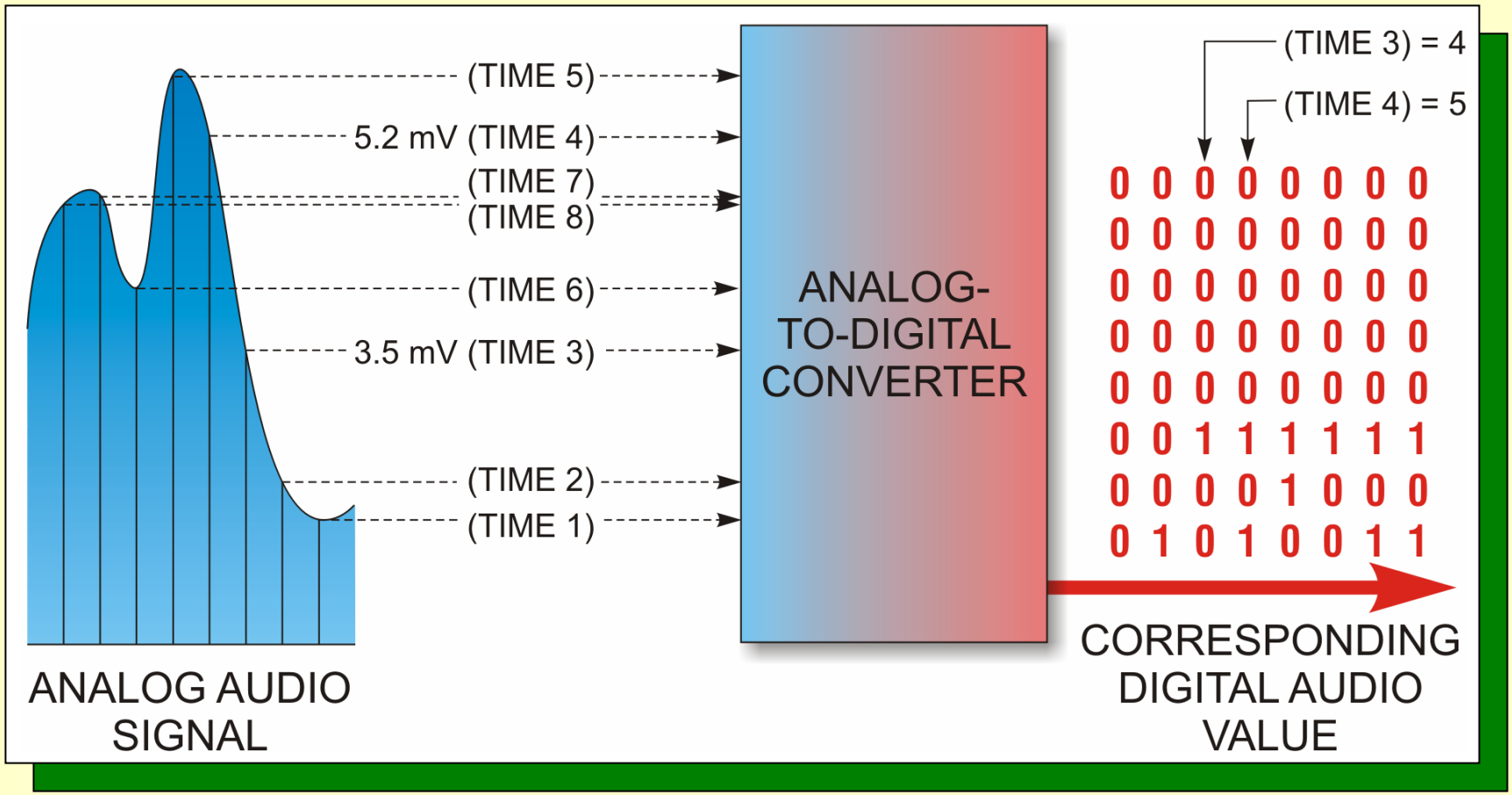

Figure 4-52: Converting Analog Signals to Digital Values

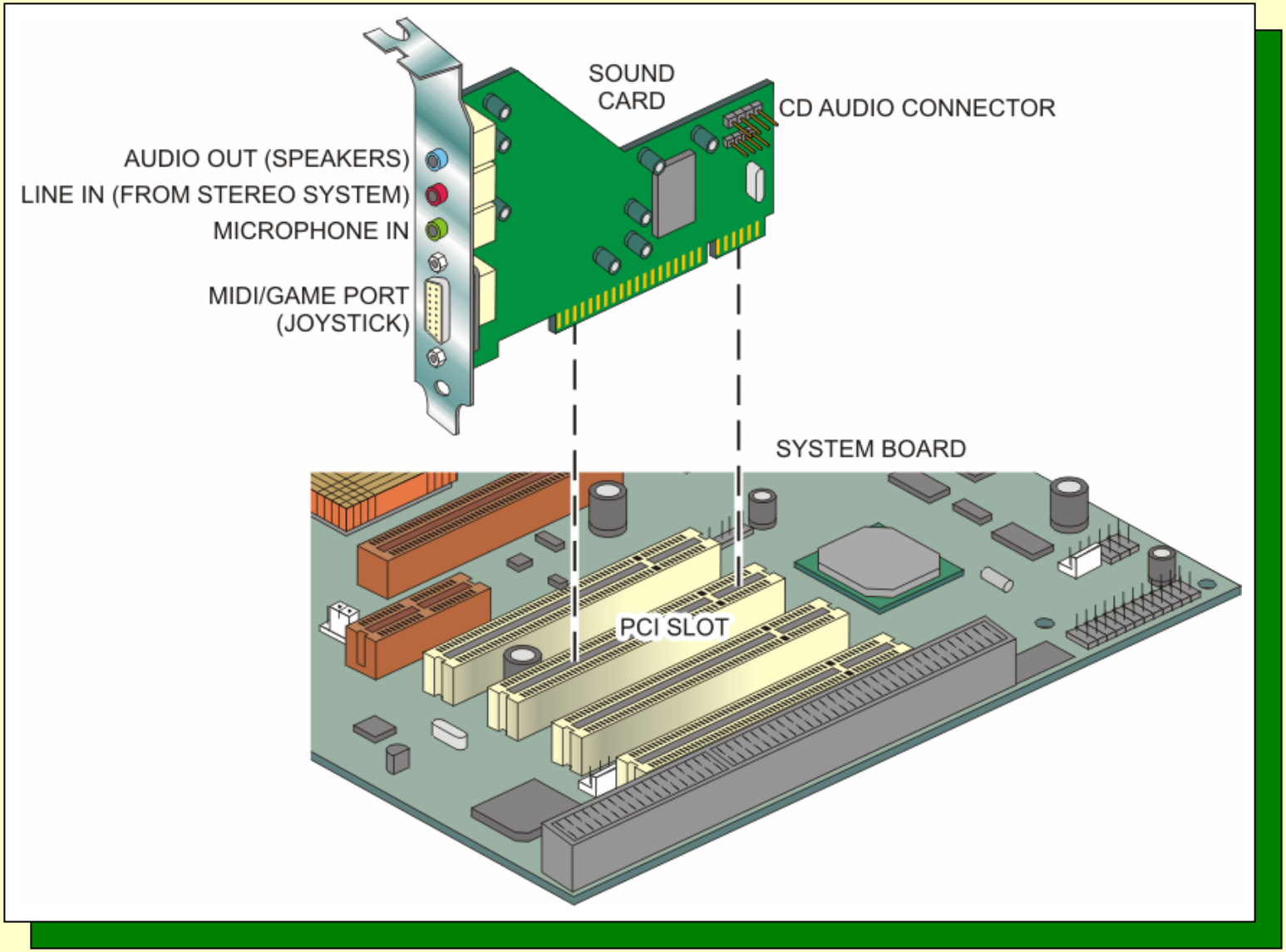

Figure 4-53: Sound Card Connections

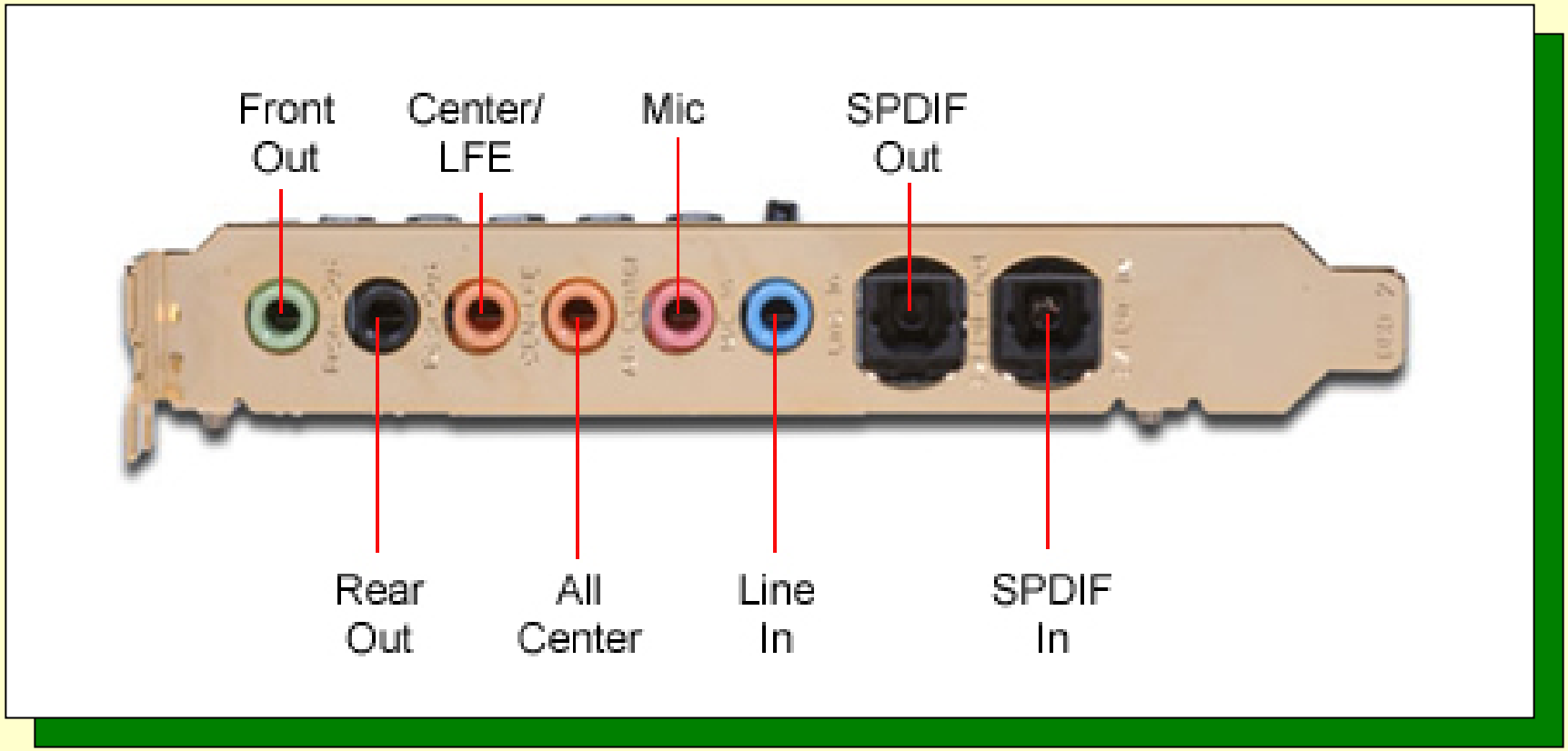

Figure 4-54: Advanced Sound Card Connections

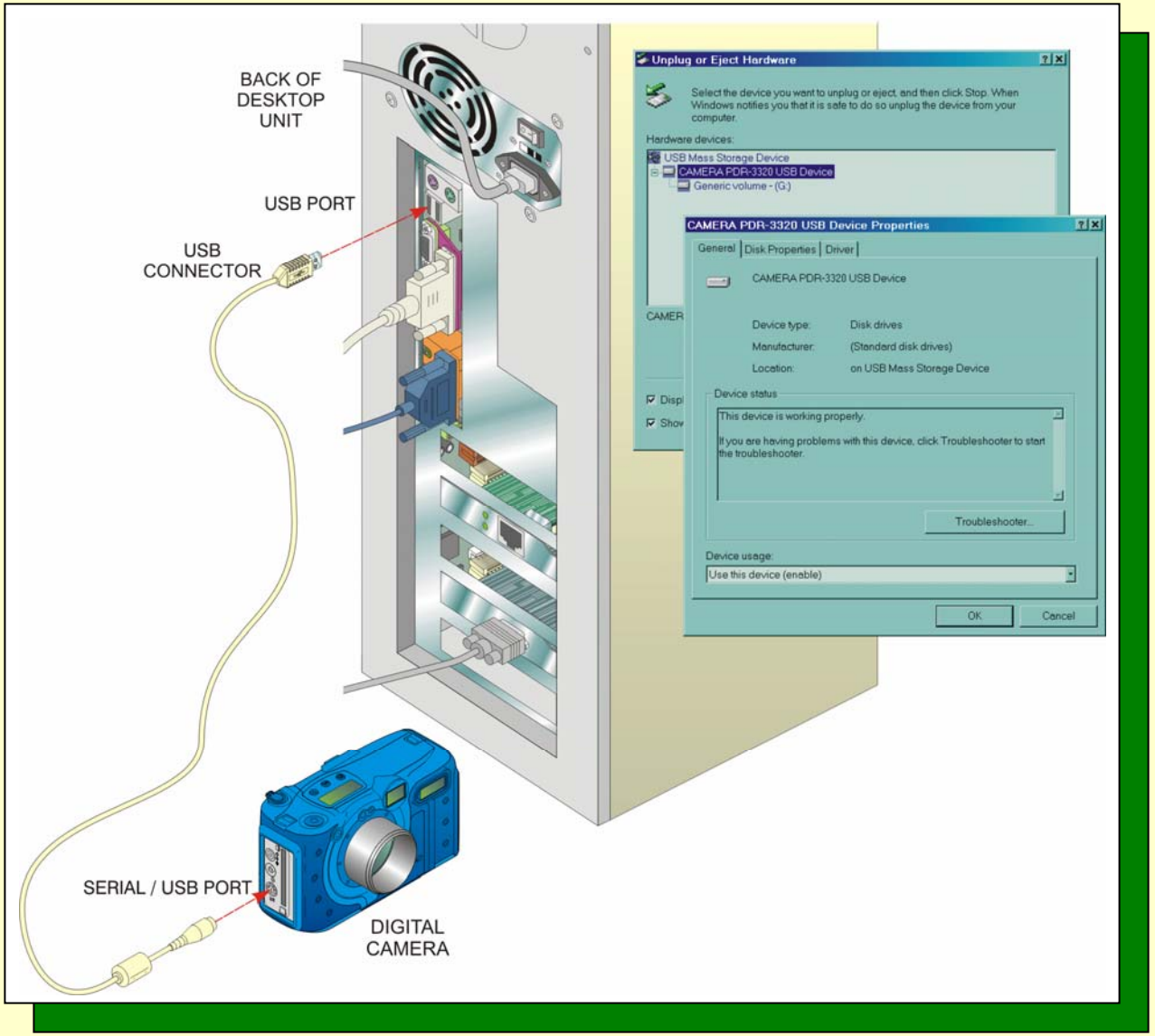

Figure 4-55: Digital Camera Connection

Steps for installing these types of peripherals and systems are generally similar from device to device:

1. **Remove the system unit's cover and take out an expansion slot cover.**
2. **Check the adapter card's user's manual for any manual configuration information and set up the card as required.**
3. **Insert the card into the empty expansion slot.**
4. **Connect any necessary cabling to the adapter card.**

(continued)

Steps for installing these types of peripherals and systems are generally similar from device to device: (continued)

5. Connect any external power supply connections to the peripheral device.

6. Start the machine. The Windows operating system should detect the new device if it is PnP-compatible. If it does not, you will need to load drivers for the device from its installation media (disk or CD).

7. Shut down the system, turn it off, and reinstall the system unit's outer cover.

You should always use the following guidelines for upgrading adapter card-based peripherals in a system:

1. ***Verify compatibility*** **- When you are installing adapter cards, you should verify their compatibility with the system board, its adapter slot, and the other cards installed in the system. For example, if you are upgrading a PCI card, you should make sure that the voltage is compatible with the available PCI slot. If your PCI slots only support 3.3 V adapters, then the card you are upgrading to also needs to be 3.3 V.**

(continued)

You should always use the following guidelines for upgrading adapter card-based peripherals in a system: (continued)

2. ***Perform BIOS upgrade*** **- A system BIOS upgrade is not required when upgrading adapter cards, but some adapter cards contain their own specific BIOS. These BIOS may need to be upgraded to permit the adapter to work with the other components in the system. If in doubt, refer to the installation documentation and the manufacturer's Web site for specific information pertaining to the adapters you are using.**

(continued)

You should always use the following guidelines for upgrading adapter card-based peripherals in a system: (continued)

3. **Obtain the latest drivers - In most cases, the drivers that came with an adapter card include the necessary drivers for the operating system you are using. However, the latest driver on the CD-ROM or floppy disk supplied with the component is often not the latest driver available for the noted operating system. Check the manufacturer's Web site for newer versions.**

(continued)

You should always use the following guidelines for upgrading adapter card-based peripherals in a system: (continued)

4. ***Implement ESD best practices*** **- To prevent the adapter from being damaged, make sure that it is enclosed in an antishock bag when not in use. Make sure that you wear an antistatic device when handling the adapter. Most adapters include static-sensitive components that can be damaged by very small electromagnetic shocks, so take extra care when handling or installing your adapter cards.**

(continued)

You should always use the following guidelines for upgrading adapter card-based peripherals in a system: (continued)

5. ***Verify upgrade*** **- There are specific attributes that are common when verifying proper installation of a wide variety of adapter cards. For instance, all adapters use resources, such as IRQ, I/O memory, or base memory address. You must make sure that none of these settings conflict with those of other hardware devices in the system.**

Installing a USB or Firewire device usually involves the following steps:

1. Enable the USB resources in the CMOS Setup screen, as illustrated in Figure 4-56. In some cases, this involves enabling the port and reserving an IRQ resource for the device.

(continued)

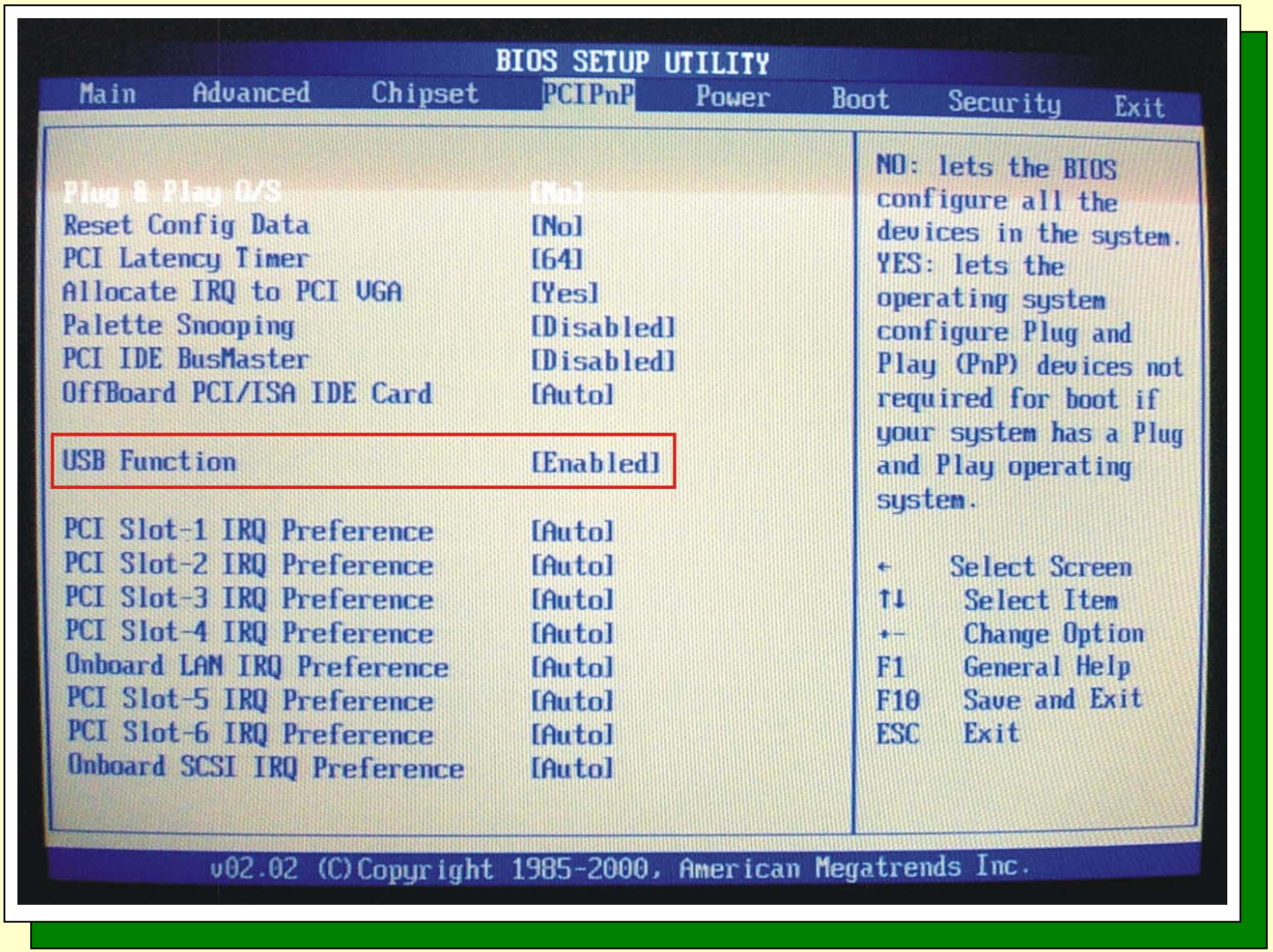
BIOS SETUP UTILITY
Main Advanced Chipset PCIPnP Power Boot Security Exit
Plug & Play O/S [No]
Reset Config Data [No]
PCI Latency Timer [64]
Allocate IRQ to PCI VGA [Yes]
Palette Snooping [Disabled]
PCI IDE BusMaster [Disabled]
OffBoard PCI/ISA IDE Card [Auto]
USB Function [Enabled]
PCI Slot-1 IRQ Preference [Auto]
PCI Slot-2 IRQ Preference [Auto]
PCI Slot-3 IRQ Preference [Auto]
PCI Slot-4 IRQ Preference [Auto]
Onboard LAN IRQ Preference [Auto]
PCI Slot-5 IRQ Preference [Auto]
PCI Slot-6 IRQ Preference [Auto]
Onboard SCSI IRQ Preference [Auto]
NO: lets the BIOS configure all the devices in the system. YES: lets the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.02 (C)Copyright 1985-2000, American Megatrends Inc.

Figure 4-56: Enabling the USB Resources

(continued)

Installing a USB or Firewire device usually involves the following steps: (continued)

2. Plug the device into an open USB connector.

3. Wait for the operating system to recognize the device and configure it through the PnP process.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
Found New Hardware
KODAK DC3400 ZOOM Digital Camera
Installing ...
To continue, click Next.
< Back
Next >
Cancel

Figure 4-57: The Windows Found New Hardware Wizard

TEST TIP

Be aware that IrDA operations must be enabled in CMOS before any infrared activities can occur.

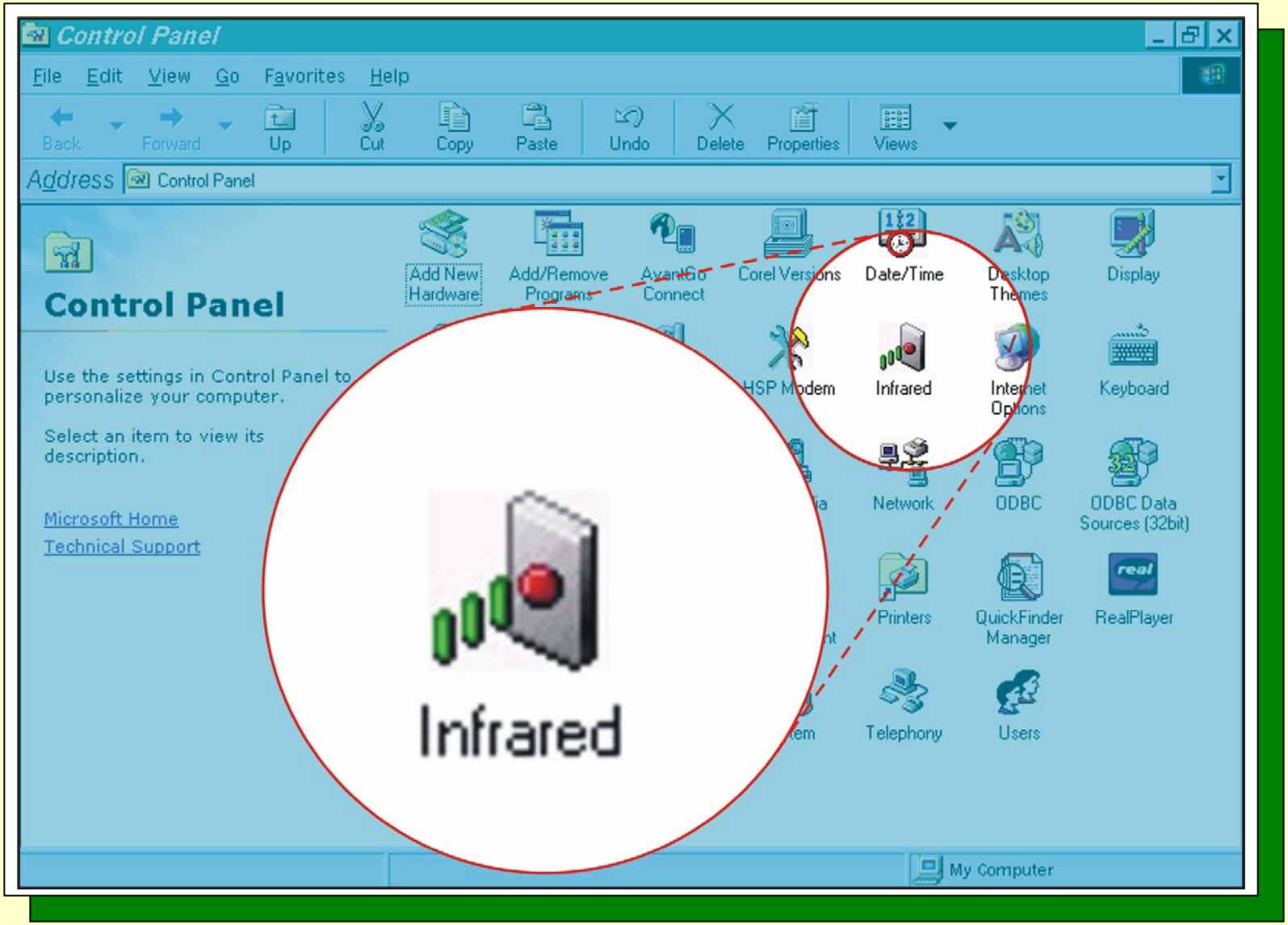

Figure 4-58: The Windows Wireless Link Icon

TEST TIP

Be aware of how to know that an IrDA-capable device is within range of a host system.

You should use the general procedure that follows when you are upgrading a system's peripheral devices:

1. ***Verify compatibility*** **- Because peripheral devices can vary greatly in their configuration and use, you should always refer to the device's documentation to ensure that it will work properly with your system. Because external devices must connect to the computer through its interface ports (i.e., serial and parallel ports, USB, Firewire, and in some cases external SCSI connectors), you must ensure that the proper port is available for the device to be installed.**

(continued)

You should use the general procedure that follows when you are upgrading a system's peripheral devices: (continued)

2. *Perform firmware upgrade* - Prior to installing a peripheral, consult the manufacturer's Web site for any updates that may exist for its firmware, or any updated device drivers that may be available. To apply firmware updates, you must first obtain the firmware update tool from the manufacturer.

(continued)

You should use the general procedure that follows when you are upgrading a system's peripheral devices: (continued)

3. *Obtain the latest drivers* - In most cases, the installation software that came with the peripheral will have the necessary drivers for the operating system you are using. The latest driver on the installation CD or floppy disk is usually only the latest driver available at the time the peripheral shipped.

(continued)

You should use the general procedure that follows when you are upgrading a system's peripheral devices: (continued)

4. *Implement ESD best practices* - Peripherals tend to be less sensitive to electrostatic damage than PC board devices and are often directly grounded through their power cords. However, because peripheral devices tend to be expensive, you may still want to properly ground yourself before working with them. It is always better to be safe than sorry.

(continued)

You should use the general procedure that follows when you are upgrading a system's peripheral devices: (continued)

5. *Verify the upgrade* - Because peripheral devices can vary greatly in their configuration and use, there are a variety of ways that you can test your upgrade. For instance, with a printer you can print a test page, print a page from a client, or print multiple print jobs to test the queue. For a zip disk, this may include moving data onto the disk and then trying to examine the data on another computer later.

(continued)

You should use the general procedure that follows when you are upgrading a system's peripheral devices: (continued)

6. ***Check system resources*** **- Normally, peripherals use the resources associated with the port they are attached to. If the peripheral tests OK, you will normally not have to verify system resources.**

KEY POINTS

- **In addition to the millions of possible memory locations in a PC, there are typically thousands of addresses set aside for input and output devices in a system. In order for any device to operate with the system's microprocessor, it must have an address (or group of addresses) at which the system can find it.**

KEY POINTS

- **Interface circuits are necessary because the characteristics of most peripherals differ greatly from those of the basic computer. Most interface circuits in the PC-compatible world have been integrated into application-specific ICs.**

KEY POINTS

- When dealing with a PC-compatible, there are two forms of I/O to contend with. These include the system board's on-board I/O, and peripheral devices that interact with the system through its expansion slots.

KEY POINTS

- **Parallel ports have been a staple of the PC system since the original PCs were introduced.**

KEY POINTS

- **Microsoft operating systems keep track of the system's installed printer ports by assigning them the logical device names (handles) LPT1, LPT2, and LPT3. Whenever the system is booted up, the operating system searches the hardware for parallel ports installed at hex addresses 3BC, 378, and 278 consecutively.**

KEY POINTS

- As the distance between the computer and a peripheral reaches a certain point (10 feet), it becomes less practical to send data as parallel words. An alternative method of sending data is to break the parallel words into their individual bits, and transmit them, one at a time, in a serial bit stream over a single conductor.

KEY POINTS

- **Two methods are used to provide the proper timing for serial transfers: The data bits may be sent synchronously (in conjunction with a synchronizing clock pulse) or asynchronously (without an accompanying clock pulse).**

KEY POINTS

- **The operating system assigns COM port designations to the system's serial ports during bootup.**

KEY POINTS

- **COM port designations are normally COM1 and COM2 in most systems, but they can be extended to COM3 and COM4 in advanced systems.**

KEY POINTS

- **Peripherals are devices and systems that are added to the basic system to extend its capabilities. These devices and systems can be divided into three general categories: input systems, output systems, and memory systems.**

KEY POINTS

- **The universal serial bus (USB) was developed to provide a fast, flexible method of attaching up to 127 peripheral devices to the computer. The USB provides a connection format designed to replace the system's traditional serial and parallel port connections.**

REVIEW QUESTIONS

1. **Explain the differences between SDTV and HDTV.**

REVIEW QUESTIONS

2 **Where would you be likely to find an S/PDIF connector in a PC system?**

REVIEW QUESTIONS

3 **Describe the different methods commonly used to interface bar code readers to a PC system.**

REVIEW QUESTIONS

4 **Which type of data transfer technique involves a high-speed device taking over the system busses from the microprocessor to conduct I/O read and write operations?**

REVIEW QUESTIONS

5 **An executive of a small company is concerned about purchasing digital cameras for her assessment team. Her main concern is that the digital camera connect to the workstation properly. List all the traditional connections that a digital camera can use to connect to a workstation.**

REVIEW QUESTIONS

6 **What is the function of a shadow mask in a CRT display?**

REVIEW QUESTIONS

7 **A user wishes to connect a Firewire-compatible video camera with his workstation. However, before he requests a purchase for all required devices, he wants to make sure that the cable segment will be long enough so he can place the video camera on a tripod in a specific place at his office and still be connected to the workstation. What is the maximum segment length for an IEEE-1394 connection in terms of feet?**

REVIEW QUESTIONS

8 **You are establishing a component video connection between a media center PC and a flat panel television/video display, how many cables should this involve and what colors should they be?**

REVIEW QUESTIONS

9 **How many USB devices can be attached to the USB port of a PC?**

REVIEW QUESTIONS

10 **What is the maximum recommended distance for an IrDA link?**

REVIEW QUESTIONS

11 **State the maximum segment lengths for low- and high-speed USB connections.**

REVIEW QUESTIONS

12 **How many devices can be connected to a single IEEE-1394 port?**

REVIEW QUESTIONS

13 **Which port types include high-speed data streaming modes that can transfer large streams of data such as audio or video information?**

REVIEW QUESTIONS

14 **What type of device normally uses IRQ14?**

REVIEW QUESTIONS

15 **When reviewing the specification for a particular video display, you read that it features a 0.28 mm dot pitch. What does this mean?**

EXAM QUESTIONS

1 **Which device or port uses IRQ8 in a PC-compatible system?**

a. Keyboard buffer
b. Math coprocessor
c. RAM refresh controller
d. Real-time clock module

EXAM QUESTIONS

2 **At what I/O port addresses does the system communicate with the primary hard disk (IDE) controller?**

a. 0F8-0FF
b. 1F0-1f8
c. 200-207
d. 278-27F

EXAM QUESTIONS

3 **What type of connector is normally found on PC-compatible keyboards? (Select all that apply.)**

a. A 6-pin mini-DIN connector
b. A 5-pin DIN connector
c. An RJ-11 connector
d. An RJ-45 connector

EXAM QUESTIONS

4 **Which type of I/O port employs a 2-row 15-pin, D-shell female connector?**

a. VGA port
b. ATX mouse port
c. LAN port
d. Game port

EXAM QUESTIONS

5 **Which video display standard is capable of providing a maximum output resolution of 1600 × 1200 pixels?**

a. WVXGA
b. SXGA
c. UXGA
d. SVGA

EXAM QUESTIONS

6 **Select the option that is not found on the back plate of a typical audio sound card.**

a. Line-in
b. Line-out
c. Speaker
d. Microphone

EXAM QUESTIONS

7 **If you establishing a component video connection between a media server PC and a television/video display unit, what connection standard offers the best performance?**

a. SVGA
b. S-video
c. DVI
d. HDMI

EXAM QUESTIONS

8 **A user complains that he is unable to find a cord or plug to connect his brand-new PDA to the workstation. Reading through the PDA manual, you note no mention of additional cords to interface with the PDA. All other functions of the PDA appear to be working. What is the most likely solution?**

a. A The PDA is defective.
b. The PDA is missing cabling.
c. The PDA uses wireless connections to transfer data.
d. The PDA does not have batteries installed.

EXAM QUESTIONS

9 **Which DMA channel has a dedicated function in a standard PC?**

a. Channel 6 for the FDD controller
b. Channel 2 for the FDD controller
c. Channel 3 for the EPP port controller
d. Channel 1 for the keyboard controller

EXAM QUESTIONS

10 **Choose the event that will cause an NMI error to occur.**

a. Adapter card error
b. Hard drive failure
c. Power failure port
d. User error